

TEACHER PERCEPTIONS OF PARTICIPATING IN THE
MISSOURI PROFESSIONAL LEARNING COMMUNITIES (MPLC) PROJECT

BY
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ABSTRACT

The purpose of this study was to examine teachers' self-reported perceptions regarding implementation of the Missouri Professional Learning Communities (MPLC) Project PD program and the three domains of the MPLC Project training from year one of implementation through year three of the program. This study examined the influence of PLC training as it was integrated into the K-12 educational school setting as demonstrated by the analysis of teacher's perceptions utilizing the Benchmark Assessment Tool (BAT). The BAT's intent was to measure the perceptions and behaviors of teachers in different stages of the MPLC Project PD program. This quantitative study found five key conclusions when studying teachers' perceptions and behaviors during the implementation of a PLC initiative. First, the impact of time and experience was more significant when evaluating teachers' progress towards changing their perceptions and behaviors to implement PLC goals than the type of training the teachers received. Second, elementary teachers are more adaptive to the goals of this PLC initiative than the middle school and high school teachers. Third, the collaborative relationship is a key to successful PLC implementation when it is considered that both experience and time matter. Next, the train-the-trainer model actually worked to administer the PLC frameworks in all K-12 settings. Finally, PLCs likely impact student performance due to the positive growth in teacher perceptions about both student learning and teacher learning over time.

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CHAPTER ONE

Introduction

Introduction to the Study

As increased accountability for student achievement becomes the norm in public education, education will continue to face a number of reform efforts aimed at meeting the need for increased educator training and development. President Obama's (2010) Forum on Educational Accountability (2010) and the National Commission on Teaching and America's Future (2005) have all argued that ongoing educator learning and development should be a focus of current reform efforts. Schools are challenged with meeting the increased call for accountability as demonstrated by demands for increased outcomes on annual performance reports that begin at the local level.

Marzano, Schooling, and Toth (2010) asserted that the best professional development (PD) experiences for teachers occur when they interact with each other about what worked and what did not work in their classrooms utilizing evidence collected via observations and student data. Recent education literature highlights the association of collaborative teams to Professional Learning Communities (PLCs) (Blankstein, 2004, DuFour, Eaker, & Karhanek, 2004; DuFour, Wei, Darling-Hammond, Andree, Richardson, & Orphanos, 2009; Eaker & DuFour, 2009; Reeves, 2011). The allure of the PLC model of school improvement is that it does not depend upon external resources but instead rallies a school's internal professional capacity, breaking teacher isolation and creating an environment in which teachers improve together is a rich source of untapped resources. Lieberman (1986) contended that, "Contexts, needs, talents and commitments differ, but one thing appears to be constant: schools cannot improve without people working together" (p.6). In another study, Lieberman (1990) went on, "each school needs to establish a collaborative culture as a precondition for its own

development” (p. IX). Senge (2006) offered a single definition of learning organizations that captures the point. They are, “organizations where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together” (p. 3).

The purpose of this study is to examine teachers’ self-reported perceptions regarding implementation of the Missouri Professional Learning Communities (MPLC) Project PD program and the three domains of the MPLC Project training from year one of implementation through year three of the program. This study will examine the influence of PLC training as it is integrated into the K-12 educational school setting as demonstrated by the analysis of teacher’s attitudes utilizing the Benchmark Assessment Tool (BAT). The BAT’s intent was to measure the attitudes and behaviors of teachers in different stages of the MPLC Project PD program. Within the BAT there are three specific domains assessed: collaboration, student learning, and teacher learning. The collaborative domain is concerned with how teachers work together whereas the teacher learning domain is interested in what teachers do to attend to their own professional development. The final domain, the student learning domain, investigates what teachers use to learn more about the learning of their students. Within these three domains there exists a series of benchmarks and specific practices that define the conditions in order for an organization to sustain the PLC philosophy of operation.

The collaborative domain is identified by 5 benchmarks and 15 specific practices to determine *how* teachers work together. The student learning domain is evaluated on a different set of 5 benchmarks and 13 practices to assess the work of teachers toward the goal of implementing regimented and explicit PLC methods. This domain is concerned with what

teachers use to learn more about the learning of their students. Four of the practices in the collaborative domain and one practice in the student learning domain will not be considered for this study as they are administratively reported. Teacher learning is the third domain that consists of two benchmarks and five practices. Teacher learning examines what teachers do to attend to their own professional development. Ultimately, the BAT was designed to identify PLC features that are thriving, highlight areas for improvement, magnify the results-oriented PLC practices, evaluate progress towards the three PLC domains of collaboration, student learning, and teacher learning, and focus overall efforts of the twelve benchmarks towards a PLC centered on student achievement and behavioral support (Burns, 2010). For the purpose of this study, teachers' perceptions, by year of MPLC implementation and each of the domains, will be the focal point of the research. Teachers' self-reported perceptions regarding implementation of the program and the three domains of the MPLC Project training from year one of implementation through year three of the program are examined.

The mission of the MPLC Project is to support Missouri schools in building and sustaining PLCs where collaborative cultures result in high levels of learning for all and increased student achievement (Gordon & Smith, 2015). PLCs are a process for schools to use in order to develop a tiered system of support that is accessible by each student. The PLC structure includes common elements such as identifying essential learning and developing common formative assessments for use in continuous screening of students in an exact manner that is outlined in the data team system of support. PLCs are the "what" of school improvement, and the practices of data teams, within PLC practices, serves as the "how" (Peery, 2011).

The implementation of the MPLC Project is administered by MPLC statewide resource specialists located in each of the nine Regional Professional Development Centers (RPDC)

located throughout Missouri to provide teachers access to high quality PD. The nine centers are located in Cape Girardeau (Southeast Center), Columbia (Heart of Missouri), Kansas City (Kansas City), Kirksville (Northeast), Maryville (Northwest), Rolla (South Central), Springfield (Southwest), St. Louis (St. Louis) and Warrensburg (Central). Although these centers are located regionally, a school district may choose to utilize services from any RPDC. Each RPDC is assigned a state supervisor in their respective region.

The MPLC Project is a state supported initiative that began in the 2003-2004 school year based upon the idea that PD should be of greater duration. Although this research is based on the MPLC project, it is interesting to note that this program is actually an evolution of the Missouri Accelerated School Project, which had served as a school reform initiative for many years before (Gordon, 2014). The MPLC project's funds are derived from what is typically referred to as the Professional Development Fund, or more formally, the legislative approved fund titled, Critical Needs Fund. The MPLC consists of a four-year membership in the PD initiative that involves a training curriculum, on-site support, technical assistance and two implementation assessments known as the Internal Review (IR) and the BAT. The IR is an informal tool utilized throughout the training sessions and onsite visits. The BAT is an annual survey that is completed online each year. More information regarding the assessment tools will be shared later in this section.

By the 2007-2008 school year, the MPLC Project had expanded to reach all nine of the Regional Professional Development Centers (RPDC). The implementation of the MPLC Project is administered by MPLC statewide resource specialists located in each of the nine RPDCs located throughout Missouri to provide teachers access to high quality PD. The fundamental guiding principles of the MPLC Project were built upon the foundation of three big ideas: focus on learning, collaborative culture, and results orientation. The sustained support of PLCs is

evident as the nine RPDC regions provided support to 249 schools in the state of Missouri during the 2014-15 school year (Gordon & Smith, 2015).

Prior investigations of collaborative teams have provided new knowledge and new perspectives that have the potential to influence overall school improvement tactics. In unison with the Center for Performance Assessment, Reeves (2004) reported positive student results with the use of PLC themes such as teacher collaboration for professional growth, the use of student data to monitor student learning, the use of formative assessments to guide instructional decisions, and the implementation of common lesson planning and assessment practices. The positive effects of PLCs are consistently reported in educational research examining if student achievement is impacted as a result of PLC implementation. Numerous studies connect teacher collaboration that is focused on teaching and learning with increased student achievement (Blankstein, 2004; Lieberman & Miller, 2005; Newmann & Wehlage, 1995). A Texas study reported that the majority of the 64 schools studied who had implemented PLCs for at least 2.5 years have reported a mean change of scores of 5.25 points on the Texas Assessment of Knowledge and Skills (TAKS) scores in Mathematics and Reading (Hughes & Kritsonis, 2007). The findings from such studies support DuFour and Fullan's (2012) notion that the implementation of PLCs is the most promising strategy for improving and sustaining student achievement.

Collaborative team practices can support the development of learning organizations as leaders through better understanding of adult learning theory and the needs of adult learners. Shifting to a culture of meaningful collaboration, necessary to the implementation of PLCs, has been described as the single most important factor for sustaining successful school improvement and overall effectiveness of a school (DuFour & Eaker, 2005). In order to understand how

teachers perceive the development of PLCs in one state model, this study will examine the impact of teachers' perceptions within the three domains of collaboration, teacher learning, and student learning in educational organizations. Attributes of teacher actions within collaborative teams are in the form of learning, critical reflection, and experiential learning which lead adults to recognize and reshape their patterns of believing, thinking, and feeling (DuFour et al., 2004).

Background of the Study

PLCs have emerged as an effective school improvement model. The development of quality teacher practices and characteristics must be a priority for school improvement as research has conveyed that effective teachers have more impact on student learning than any other factor under the control of school systems including class size or the heterogeneity of student groupings (Bill & Melinda Gates Foundation, 2010; Marzano et al., 2010; Weisberg, Sexton, Mulhern, Keeling, Schunck, Palcisco & Morgan, 2009; Wright, Horn, & Sanders, 1997). Marzano (2011) conducted a seminal meta-analysis on teaching and learning indicating that the quality of a teacher, and the instructional strategies the teacher employs, are the most important factors in student achievement that a school can control. The collegial relationships teachers engage in are closely connected to the types of teaching and learning relationships teachers have with their students (Fullan & Hargreaves, 1996). This reflects Senge's (1990) argument about the importance of shared vision, "The practice of shared vision involves the skills of unearthing shared 'pictures of the future' that foster genuine commitment and enrollment rather than compliance. In mastering this discipline, leaders learn the counter-productiveness of trying to dictate a vision, no matter how heartfelt" (1990, p. 9)

Teaching is complex and there are few interactive learning systems in place that capture the complexity of a system needed to attend to the needs of teachers, especially novice teachers

(USDE, 2010). Alter (2009) compared external education initiatives to spreading peanut butter, in that widespread efforts make members look like they are doing something for education. Teachers are not widgets; they are not interchangeable and their needs are not met by simply spreading the same experiences throughout the faculty. Collaborative teams working to devise systems that will incent teachers to identify practices that will allow them to do what they do in the best way possible is a more effective approach (Weisberg et al., 2009).

The study of how PD contributes to the growth of collaborative team practices impacts the mindset of the group to move from one of knowledge acquisition to one of reflection and action (Cole, 2012). Collaboration is a process that involves teachers engaging in debates, discussions, and critical questioning of the content and the pedagogy in which they teach (Torres & Marriott, 2010). Collaborative learning is an idealized model of adult learning in which learners are actively engaged versus being receptacles of information. Critical reflection, discourse and relationships are key ingredients to guide new perspectives and guide future actions of collaborative teams. The process of using current knowledge to create new knowledge is the foundation of learning, more specifically, learning that is transformational (Boyd & Myers, 1988). DuFour et al. (2010) have established that teacher collaborative teams are a fundamental building block to facilitate continuous school improvement. Collaborative learning allows participants, at various performance levels, to work together in small groups toward a common goal with a responsibility to each other so that the success of one learner helps all participants to be successful (Torres & Marriott, 2010). Collaborative teams work together in groups to reach common goals; members benefit from sharing ideas rather than working in isolation.

Providing teachers the opportunity to participate in collaborative PD within the context of the workplace on a routine basis is necessary for purposeful change to materialize in teachers'

practice (Darling-Hammond & Richardson, 2009; Fullan, 2014; Lieberman & Miller, 2005; Little, 1999). Although it is clear what ought to be happening, Diaz-Maggioli (2004) described the current landscape in which teacher learning is isolated and not shared with peers; one in which a culture of isolation rather than cooperation is promoted. The stark reality is that this description is the norm for most teachers. Fullan (1995) highlighted a dramatic point of view in his support of collaboration, going so far as to point out that without the development of collaborative skills and relationships, teachers will be unable to bring needed change in their practice as collaboration is paramount to the fulfillment of ongoing personal learning. A PLC embodies a mission that promotes a continuous learning culture in which the practices and outcomes are analyzed by teachers in order to make concentrated decisions on methods that support students' needs (DuFour & Fullan, 2012). The development of a collaborative culture is created in which every action is judged by the results produced to enhance student learning (Reeves, 2008).

Collaborative teams are constructed to assemble the knowledge and breadth required to complete many of the complex tasks organizations face today (Gratton & Erickson, 2007). The core capabilities of organizations are based increasingly on knowledge-seeking and knowledge-creation. According to Powell (1998), there are large gains from innovation and steep losses from obsolescence, hence collaboration, and the competition that results as a part of collaboration, is best regarded as a learning race. The learning race is two-fold; one direction involves learning from collaborations, the other concerns learning how to collaborate. Both contests require the development of skills to facilitate the transfer of information and knowledge. Through collaboration, it becomes the team, not the individual, which is viewed as the main learning unit. High-quality collaboration has become no less than an imperative (Gajda &

Koliba, 2007). Collaboration is often assumed to be a solid path to efficiently pooling scarce resources while building community by strengthening interorganizational ties (Thomson, Perry & Miller, 2009). The collaborative process is best embodied by a team that comes together to achieve a vision, doing something that could not otherwise be accomplished as independent actors working alone (Woodland & Hutton, 2012).

The Leadership and Learning Center of Englewood, Colorado conducted a study of Missouri's school-improvement initiatives in the Spring of 2010 (Burns, 2011). Several initiatives were reviewed and evaluated based on the greatest potential impact on student achievement. PLCs had the greatest potential impact on student achievement of the initiatives reviewed. In Missouri, when schools have pursued the PLC journey effectively integrating the eight systemic strands, student achievement has followed (Burns, 2011). The MPLC Project processes and designs are focused on assessing each organization's current status and then proceeds with foundational, targeted and focused PD learning that move the organization forward through achieving deep implementation ratings on the PLC Implementation Rubric (IR) formatively, and the BAT, summatively. In the executive summary of overall findings, the Leadership and Learning Center emphasized that "depth of implementation is most clearly related to gains in student achievement for PLCs" (Burns, 2011, p. 2).

Conceptual Underpinnings

The conceptual framework of this study is rooted in the importance of fostering participation and working collaboratively in a climate of mutual respect found in the principles of adult learning theory (Moore, 1988). The appreciation of teacher PD is aimed at the journey of a purposive sampling of teachers working within a MPLC Project initiative focused on the development of teachers' skills in three domains: collaborative teacher teams, student learning

and teacher learning present within PLC constructs. Action learning is one approach of andragogy that has been explored since Knowles proposed the five factors involved in adult learning theory (Merriam, 2001). Andragogy, as expressed by Knowles (Merriam, 2001), outline five assumptions of the adult learner who is described as one who:

- Has an independent self-concept and who can direct his or her own learning
- Has accumulated a reservoir of life experiences that is a rich resource for learning
- Has learning needs closely related to change social roles
- Is problem-centered and interested in immediate application of knowledge
- Is motivated to learn by internal rather than external factors (Merriam, 2001, p.5).

Action learning is a theory related to adult learning (Stewart, 2001). Action learning holds many similarities to learning communities. One notable component of action learning that is characterized in learning communities is the small components that create the main team involved in a learning community (Yarks, 2000). O'Neil & Lamm (2000) explained, "Action learning is defined as an approach to working with, and developing people, which uses work on a real project or problem as the way to learn. Participants work in small groups or teams to take action to solve their project or problem, and learn how to learn from that action. A learning coach works with the group in order to help them learn how to balance their work, with the learning from that work" (p.44).

Much research has examined the promise that PLCs and collaboration can provide for schools to become supportive environments offering continued learning opportunities and increased student achievement (Louis, Kruse & Marks, 1996; McLaughlin & Talbert, 2001; Newmann & Wehlage, 1995; Newmann, Smith, Allensworth & Bryk, 2001; Smith, Lee & Newmann, 2001). The allure of the PLC model of school improvement is that it does not depend

upon external resources but instead rallies a school's internal professional capacity (Blankstein, 2004, DuFour & Eaker, 2005, DuFour et. al, 2004, Reeves, 2011). To establish effective teacher collaboration groups with the capacity to create changes in student achievement, teachers must understand and implement action research as part of their teacher learning. Teacher's collaborative action research is a component of the PLC model where teachers continuously "store, retrieve, examine, transform, apply, and share knowledge and experiences about practice for a shared purpose is the single-most important vehicle for school renewal" (Gajda & Koliba, 2008, p. 139).

The importance of collaborative teams in the workplace can be attributed to the core emotional need to feel valued and valuable (Schwartz, 2011). When employees feel a sense of contribution to the greater good of the organization, it also creates a sense of equilibrium, security and well-being (Schwartz, 2011). As Norwood (2007) explained, "Collaborative efforts may seem at first to be hard to organize and keep going, yet under the PLC model of small groups working together within a larger group, the collaborative teams can be organized as either academic, grade level, or any other sub group that works well within the framework of what the PLC's are hoping to accomplish" (p. 33).

Statement of the Problem

Teacher collaboration and collegiality are promoted as key factors contributing to school improvement and teacher development (Little, 1999; Rosenholtz, 1989; Harris & Muijs, 2004; Lieberman & Miller, 2005; Blankstein, Houston, & Cole, 2008). The underlying assumption in PLCs is that peer collaboration has the potential of transforming teaching practices in ways that will bring about higher rates of student achievement (Riveros, Newton & Burgess, 2012). A key target of PLCs is to enhance teacher effectiveness and teachers as professionals in order to

provide the ultimate benefit to students. More specifically, the goal of this study is to discover if membership in the MPLC Project impacts teachers' perceptions of the three domains present within the MPLC project; teacher collaboration, teacher learning and student learning. Riveros et al. (2012) pointed to a major point of emphasis in the literature on PLCs; teacher practices are something that are to be improved through the strategic application of collaborative teams. Teachers that continuously seek and share their information are able to act on what they have collectively learned from their efforts that allows teachers to concentrate their practice so that students can achieve the best possible results (Lambert, 2003).

Collaborative teams support relationships among 'equal partners' and can transform a school's organizational culture (Hargreaves, 1994). According to Hirsch (2012), "Educators working in an effective PLC join the group with the assumption that the data they examine and the needs they identify will point toward the learning they will undertake to successfully address the challenges they face" (p. 64). Teacher collaboration is a way to reconfigure the boundaries of the isolating teacher practices that plague the teaching profession and limit professional growth. PLCs can provide a structure for teachers to analyze student data which enables teachers to focus their work and implement best practices that ensure all students learn (Smith, 2012). Anfara, Caskey & Carpenter (2012) concluded, "The collective analysis of student assessment data in relation to specific learning targets is the catalyst for teacher learning" (p. 56). Likewise, Linder, Post, & Calabrese (2012) argued that the quality of the working relationships amongst teachers carries a positive value that promotes behaviors such as being supporting, stimulating, reflective and collegial.

When teachers look for ideas to improve their practice, Fullan (2010) claimed there is a strong body of evidence that indicates teachers are the preferred source of ideas for other

teachers. Equally true, Fullan (2010) continued, is the existence of equally strong pointers that indicate teachers have limited opportunities to interact with one another. PLCs are a powerful way of allowing teachers to work together to profoundly affect their practices. It requires the school staff to work collaboratively on matters related to student learning and to hold itself accountable for the implementing the kind of practices that fuel continual improvement.

While the literature points to the importance of collaboration and the PLC model as a way to promote it, little research has looked at the development of teacher attitudes during the course of PLC training. This study addresses the issue of how teachers' attitudes change over time during PLC implementation training. The rise or fall of the PLC concept depends not only on the merits of the concept itself, but on the most important element in the improvement of any school—the commitment and persistence of the educators within it. This study will help to assess the impact training has on the development of teacher perceptions and attitudes during the implementation phase of implementing key PLC practices that are identified within the three domains of teacher collaboration, teacher learning and student learning.

Research Questions

This study examines if teachers' behaviors and attitudes towards their perceived skills regarding collaboration, teacher learning and student learning are shown to increase over time with the MPLC Project implementation. The following questions guided this research:

Research Question One: Are there perception differences on the level of PLC implementation as measured by the BAT between the leadership team (LT) teachers that received direct instruction from the MPLC resource specialists and the collaborative team (CT) teacher population from year to year of the MPLC Project training?

Research Question Two: Are there perception differences on the level of PLC implementation as measured by the BAT for the leadership team (LT) teachers that received direct instruction from the MPLC resource specialists and the collaborative team (CT) teacher population from the beginning of the MPLC Project training to the end of the MPLC Project training?

Research Question Three: Are there notable perception differences on the level of PLC implementation as measured by the BAT that exist year to year between the leadership team (LT) teachers that received direct instruction from the MPLC resource specialists versus the collaborative team (CT) teacher population based upon the grade configuration of the respondent's school?

Research Question Four: Are teachers' perceptions on the level of PLC implementation as measured by the BAT more responsive to training towards one domain over another regarding the influences of the MPLC Project training on the domains of collaboration, teacher learning and student learning from the initial year to the final year of the PLC implementation process?

Significance of the Study

This study is significant for several reasons. Teacher perceptions and attitudes towards the improvement of teacher led PLC practices is an underdeveloped area of study (Blankstein, Houston, & Cole, 2008; Wei et al., 2009; DuFour, & DuFour, 2013). This study aims to strengthen the body of research regarding the degree in which specific PLC domains and practices change teacher perceptions through the application of a PLC collaborative team model of PD. The identification of the three domains and the specific practices that build the framework of the MPLC Project allows institutions to work towards a characterization of professional practices that can be identified as yielding student success. Furthermore, this study

is significant in trying to understand how the framework of a PLC initiative affects the perceptions of teachers as they develop practices that are intended to increase student achievement.

As research suggests, overall school improvement and performance could be supported by expanding the knowledge of how collaborative teams experience growth and learning (Blankstein, Houston, & Cole, 2008; Wei et al., 2009; DuFour, & DuFour, 2013). Ultimately, increasing teachers' professional capacity impacts their understanding of professional knowledge in their daily practices. The particular area of interest for this study is important because it will examine the degree to which teachers working within collaborative teams are experiencing learning that changes their attitudes based not only upon their membership in the MPLC project, but also their duration within the project.

The motivation for collaborative teams is to develop collegial practices and to shun isolating teacher practices that have been the norm for years past (American Federation of Teachers, 2007; Hargreaves, 2005; Learning Point, 2007; Lieberman & Miller, 2005). In a survey of administrative PLC experiences and opinions, Smith, Johnson, and Thompson (2012) discovered that, "Early in our district's transition to a PLC culture, we heard things like, 'I taught it, they just didn't get it'. Applying our guiding principles, we realized that we could not simply hope that students would learn, and we could not blame students if learning did not occur" (p. 57). Insights gained by this investigation may provide the opportunity for those interested in both the planning and the utilization of a PLC model to learn from understanding teacher attitudes during an ongoing PD model of learning. Examining the perceptions of educators' behaviors and attitudes during the implementation phase of the PLC journey contributes to the growing body of knowledge and provides leaders with insights regarding the

most effective methods to enhance educators' perceptions of collaboration, teacher learning and student learning. Therefore, the significance of this study is to add to the body of research to better understand the components of appropriate models of PLC implementation options.

This study is also significant because it will add to the body of literature on PLCs by examining if the teachers' perceptions across key domains changed as result of PLC training. This study will further add to the body of literature by studying the change in teacher perceptions based upon the method of training implementation such as those that receive direct training versus those who are simply changing their behaviors as a result of others attending the PLC training. Collaborative teams need certain processes and structures to be established to replicate behaviors that allow for continuous learning. In many schools there is not a clearly defined process employed to guide teachers to achieve results in their collaborative meetings thus the stagnation in school improvement efforts. According to Riveros et al. (2012), "Professional Learning Community models could be enhanced if these models incorporate a method for identifying areas of improvement; in other words, professional learning communities are not a goal in and of themselves, but they are means for school improvement" (p. 211). Many schools are simply providing the expectation that collaborative teams look at data but the lack of clearly defined processes has not yielded the results that facilitate continuous school improvement. Protocols have helped to define the physical behaviors but processes to define the meaningful work are still lacking. But as Kise (2012) argued, "Yes it takes time for Professional Learning Community members to reach consensus around a vision, but doing so can make the difference between teachers believing that collaboration is key to student achievement or seeing no value in Professional Learning Communities" (p. 39).

Finally, this study was designed to measure changes in teachers' perceptions of their behaviors and attitudes based upon participation in the MPLC Project relative to the three domains of teacher collaboration, teacher learning and student learning. This comparative study is important as it will assist in determining if the learning experiences of teachers on collaborative teams in the MPLC Project varied from each other during years one through four of the PD experience.

Assumptions of the Study

These are several assumptions inherent in this study:

1. Teachers, leadership team members and administrators self-reported their perceptions accurately for each question on the instrument.
2. Most measureable attitudes are held strongly enough to direct behaviors.
3. The sample of respondents is representative of the educators in practicing PLC districts in the state of Missouri.
4. The BAT survey instrument is an accurate measure of perceptions regarding teachers' attitudes and perceptions regarding PLC practices during PD implementation.
5. Participants do not use unique qualifiers to track individual progress over time therefore the information is assumed to be completed by the same set of teachers each year.

Limitations of the Study

There are fourteen main limitations to this study:

1. The data were gathered with the BAT survey instrument, provided by the MPLC Project, and thus, test only the standards set forth by the MPLC Project PLC reform beliefs.
2. The survey was self-reported, and it is assumed that participants gave honest responses of their perceptions rather than a contrived response that would alter overall results.

3. The study included only one type of PLC training. There are various other organizations that provide training, or PD, relating to the organization of PLCs and collaborative teams. The validity of the study could be increased if other types of training were also evaluated and compared to the initial control group.
4. The study was conducted on a purposive teacher sampling rather than a randomized assignment of teacher participation in the survey therefore the sampling is not necessarily a representative sample of all teachers in the state of Missouri.
5. The scores came from the teachers that were employed within the Missouri school districts studied demonstrating an apparent interest in the PLC reform. The teachers were not taken from a pool of teachers nationwide but rather a single geographical state divided into nine regions. Therefore, the research cannot be generalized nationwide, or even statewide given the interest of those who participated.
6. There are no controls for prior teacher learning. Teachers who may have had PLC instruction while employed in other districts still have the intellectual capital gained from prior experiences. Teachers in the district selected have not received PLC training as a collaborative team but may have been influenced by the prior knowledge.
7. There are no controls for school demographics. Schools are not compared by socioeconomic status, funding per pupil, schools' foundational makeup such as charter, private, or other school configuration types, schools' geographic makeup such as urban, suburban or rural location, or other demographic criteria. Schools are not compared by years of teaching experience, years of teacher experience in the particular school, or the level of teachers' educational attainment. A comprehensive data set would produce more

valid results of teachers' perceptions of the MPLC Project controlling for various demographic variables.

8. BAT results were limited by the degree in which the respondents understand the PLC terminology in answering the BAT survey questions. The study did not control for participant misunderstandings or confusion.
9. Elementary schools and middle schools are not configured in like patterns consistently in the state of Missouri. Teachers teaching a grade level may be reported as elementary in one school district, while being reported as a middle school teacher in another district therefore making comparisons and generalizations of the data difficult.
10. Although there are several thousand BAT responses, not all active level participants complete the survey therefore the results are not inclusive of the complete sampling population of teachers receiving the MPLC Project training. A more complete or randomized data sample would produce more valid results of teachers' perceptions of the MPLC Project training.
11. Participants select their school from a drop down menu that uses variant names and regions for their schools from year to year. Such an example would be reporting as Kansas City Elem year one and then as Kansas City Elementary year two. Another example would be regions being paired one year and reported as separate regions in the subsequent years. This increased the difficulty of using electronic software to match the schools precisely for data analysis which also increases the overall margin of error in reporting accurate results.
12. Participants are not assigned unique qualifiers to track progress over time therefore the information is assumed to be completed by the same set of teachers each year. This

increases the difficulty of tracking teachers for precise data analysis which also increases the overall margin of error in reporting accurate results.

13. The administrator responses were removed from the study. This provides a limitation to the study due to the importance of administrative leadership to support PLC implementation process.

14. The MPLC Project utilizes two instruments to gauge progress during the implementation process. The IR is only utilized with the LT whereas the BAT is given individually to the entire staff which includes administrators, CT teachers and LT teachers. Both the IR and the BAT are essential to the RPDC resource specialists in monitoring the progress of teachers participating in the MPLC Project.

Definition of Key Terms

Benchmark Assessment Tool (BAT). A whole school assessment designed to assess the level of implementation of key PLC components measuring the extent to which a school is progressing towards specified PLC features.

Collaborative teams. Hargreaves (1994) defines collaborative teams as groups of teachers developing their skills beyond personal reflection to a place of teachers sharing, developing their expertise together while no longer depending on the expertise of others. For the purpose of this study, collaborative teams will be defined as a team of people working together interdependently while engaged in collective inquiry with mutual accountability to achieve the common goal of improving instructional practices and ensuring student learning (DuFour & Fullan, 2012).

Missouri Professional Learning Communities Project (MPLC Project). The 2003-2004 academic calendar was the inaugural induction of The Missouri Professional Learning

Communities Project (MPLC). Sponsored by the Missouri Department of Elementary and Secondary Education (DESE), the MPLC is a school-improvement initiative that emerged from the Missouri Accelerated Schools Project. Both the MPLC and the Missouri Accelerated Schools Project began with foundational underpinnings geared towards whole school improvement. MPLC differs from the Missouri Accelerated Schools Project in the utilization of the PLC philosophy to guide continuous student achievement efforts.

Professional Learning Communities (PLCs). PLCs are held together by six characteristics as described by DuFour et al. (2010):

1. Shared mission, vision, values and goals.
2. Collaborative culture
3. Collective inquiry
4. Action orientation
5. Continuous improvement
6. Results orientation

Within these six characteristics, DuFour et al. (2010) indicated that the three big ideas that distinguish traditional schools from PLC schools are:

1. Relentless focus on learning
2. Collaborative culture and collective effort to support learning for all
3. Results orientation

Therefore, PLCs can be defined as a systematic process grounded in the foundation of a shared purpose to support both students and staff to achieve a shared vision of student achievement supported by data to target continuous improvement targets.

Regional Professional Development Center (RPDC). In the state of Missouri there are nine RPDC districts that are separated by political boundaries. The purpose of each of the nine RPDC districts is to provide consulting services to PK-12 teachers and administrators in a collective effort to bolster student achievement in the state of Missouri.

Summary

A review of the literature is presented in Chapter two that will cover the expansive related literature on the characteristics of meaningful PD, implementation and effectiveness of PLCs, the importance of effective collaboration and the impact of PD and PLCs on the perception of collaboration as well as the specific strategies utilized during the PLC implementation. All are related to the historical perspective on the PLC school reform effort and the overall basis of the PLC structure as it relates to adult learning theory. Chapter three will present a description of the research design as well as the methodology for data collection and the manner in which that data were analyzed after the instrumentation collected the responses. Chapter four presents the findings and a statistical analysis of the data. Chapter five will include a summary of the research, key conclusions, and the implications for further research.

CHAPTER TWO

Literature Review

Introduction

Pfeffer and Sutton (2013) described the added value in an organization that works together, or collaboratively, in comparison to the unhealthy environment that is fraught with internal competition. This concept is present within the pages of *The Knowing-Doing Gap* (Pfeffer & Sutton, 2013), where competition amongst co-workers focuses a fight on the external forces that stifle progress, rather than on the encouragement and wisdom that coworkers can provide each other. Competition, versus collegialism, is inherent within schools, especially secondary schools, contributing to the barriers that promote isolationism. Locke and Jain (1995) argued that the “rate at which individuals and organizations learn may become the only sustainable competitive advantage, especially in knowledge-intensive industries” (p. 45).

One hallmark of high-performing schools is the success its teachers have had in creating and maintaining PLCs (CCSRI, 2006). One characteristic that all thriving PLCs have in common is collaboration (CCSRI, 2006). Collaboration is a way to validate individual practices while encouraging collegial focus on student success. It is possible for an individual to learn, but not share this knowledge within the organization. Gerlach’s (1994) understanding of collaborative learning is imperative for any successful organization; he argued that, “Collaborative learning is based on the idea that learning is a naturally social act in which the participants talk among themselves. It is through the talk that learning occurs” (p.12). To understand the worth of PLCs as a model for teacher growth, it is important to examine the characteristics of meaningful PD, methods of implementing effective PLCs, and the importance

of effective collaboration, in order to determine the depth of impact these elements have on the perception of PLCs.

The worth of collaboration as a model for teacher growth is founded in the principles of effective PD, the characteristics of effective PD, the needs of adult learners, and the effect of collaboration on teacher efficacy. This review provides an overview of the significant literature regarding PLCs, teacher collaboration, and adult learning to provide support for the emerging trends in teacher PD and school improvement models as they relate to PLCs, teacher learning and student learning. The components within the review of literature will convey the knowledge and ideas that have been established regarding the importance of the interdependence of school reform efforts and PLCs for the purpose of teacher growth and development. The chapter begins with an introduction followed by an investigation of the characteristics of meaningful PD along with the implementation and effectiveness of PLCs that are followed by the importance of effective collaboration. Next, the literature on the impact of PD and PLCs on the perception of collaboration amongst teachers is provided. Finally, a summary of the review is presented. The review suggests that the underlying assumption in PLCS is that peer collaboration has the potential of transforming teaching practices in ways that will bring about higher rates of student achievement. The main objective of PLCs is a continuous improvement of student's results by teachers continuously seeing and sharing information followed by action steps based upon what they have learned. This study suggests there is a significant gap in the research as there is a poorly developed body of literature that provides a description of the processes in which teachers engage to change their perceptions and attitudes during the PLC training.

Collaborative Teams and Teacher Learning as Professional Development

Today, more than ever, educational factors point to the necessity of teacher collaboration in schools for continuous school improvement. This section sets the stage to describe how collaborative teams have become an effective PD method to increase teacher learning which leads to increased student achievement. This notion is developed by examining effective PD structures which are then evolved into a sense of teacher efficacy as teachers learn to develop strong collegial relationships. The case is then made to show how the sense of collaborative teacher leadership is related to increased student achievement. From that point, the idea of powerful collaboration is developed to show that although not much has changed in public education in the last century, conversations between teachers and the development of collaboration is a bridge that can connect teachers with isolated ideas to becoming a group of teachers engaged in collaborative teams with the ability to change the school as a whole. Teachers that recognize the experiences students have at school depend not only on the interactions with individual teachers, but also on the set of systems that are in place throughout the school. Hollins (2006) contended that when teachers collectively assume responsibility for making sure all students learn, positive results occur throughout the school environment.

Research regarding effective PD reveals that the best opportunities are those that are job embedded, sustained over time, and centered on student achievement (Chappuis, Chappuis, & Stiggins, 2009). Under this assumption, a collection of teachers working in isolation cannot produce the same results as teachers who share and develop practices together (Moirao, Morris, Klein, & Jackson, 2012). It is the information that teachers gather through the active learning steps required of collaborative action research that build a sense of efficacy (Darling-Hammond & Richardson, 2009). When teachers have direct interaction with other experienced teachers in

their content area they are able to overcome initial feelings of anxiety to reach greater self-efficacy beliefs (Darling-Hammond & Richardson, 2009).

Researchers have shown that working collaboratively in schools impacts the overall school practice and performance. Darling-Hammond & Richardson (2009) asserted that, “collaborative and collegial learning environments...develop communities of practice able to promote school change beyond individual classrooms . . .when whole grade levels, schools, or departments are involved, they create a critical mass for changed instruction at the school level” (p. 48). Reeves (2006) has determined that in “schools where leadership teams primarily attributed student achievement to student demographic variables, an average of 43.6 percent of students scored proficient or higher on a group of 25 assessments. In contrast, in schools where leadership teams primarily attributed student achievement to faculty variables, an average of 64.8 percent of students scored proficient or higher on those assessments” (p. 7).

DuFour (2005) characterized “powerful collaboration” as a “systematic process in which teachers work together to analyze and improve their classroom practice” (p. 36). This type of collaboration envisions teachers working together toward a universal set of learning goals, reviewing student assessment information and determining if classroom instruction is meeting the needs of all learners. O’Neill and Conzemius (2002) contended that “schools showing continuous improvement in student results are those whose cultures are permeated by: a shared focus, reflective practice, collaboration and partnerships and an ever increasing leadership capacity characterized by individuals who focus on student learning, reflect on student assessments and learn as a collaborative team” (p. 15).

Sadly, as Tyack and Cuban (1995) pointed out, there has been little that has changed in public education in the last century, including PD for teachers, which they believe is the most

significant variable with the greatest individual impact on student achievement in schools. Conversation is considered to bridge the gap between individual and organizational learning processes (Senge, 2000), although it is suggested that genuine dialogue is very difficult to achieve because it does not favor the influence, or acceptance, of certain voices (Oswick, Anthony, Keenov, Mangham, & Grant, 2000). The importance of fostering participation and working collaboratively in a climate of mutual respect is found in principles of adult learning theory (Moore, 1988).

Knowles conception of adult learning theory had two overarching themes regarding the learner and the material. In reference to the learner, according to the theory of andragogy, was the notion that the learner is very self-directed while the material should be very learner centered (Merriam, 2001). Each learner brings experiences which were formed from life events, work events. Claxton (1996) noted that learning takes place in people's heads, and argued that attention needs to be paid to factors that inhibit learning, causing people to be defensive or withdrawn, as well as to factors which facilitate learning.

The quality of teacher collaboration as a mode of effective PD is a recurring theme in educational literature that has been promoted as a factor contributing to school improvement and teacher development (DuFour, 2014; Little, 1999; Hord, 1997; Darling-Hammond & Richardson, 2009; Darling-Hammond, 2015). As Darling-Hammond and Richardson (2009) and Schmoker (2005) pointed out, continuous group learning, focused on defined student learning goals, is the ideal way to focus effective PD within a school. The coordination of professional learning is a prerequisite of school improvement (Hopkins, Ainscow & West, 1994) which requires the planner to handle teachers with sensitivity in order for teachers to feel they have the

discretionary autonomy needed to make decisions while allowing for individuality and each teacher's unique nature (Harris, Day, Hopkins, Hadfield, Hargreaves, & Chapman, 2013).

Schools have become centers of learning for both for students and adults. One set of challenges that adult learners face is derived from Hindin et al. (2007) who asserted that, "Learning from colleagues requires both shifts in perspective and the ability to listen hard to other adults, especially as these adults struggle to formulate thoughts in response to challenging intellectual content" (p. 372). Interactive dialogue expands the expertise of individuals by utilizing the pooled experiences of multiple people. PD in the form of teacher collaboration is one of the venues teachers utilize to maintain a sense of mission that challenges adult learners to evoke the courage to challenge mainstream knowledge. Sharing a passion for student learning brings adults to test conventional wisdom and share a passion for social justice (Nieto, 2009). Ongoing PLCs are the bedrock of the work that creates a whole school of effective teachers (Routman, 2012). When teachers are immersed in PD that is structured as active learning with a coherent focus on content knowledge, teachers have reported that they believe their knowledge and skills grew and their practice changed as a result of the learning (Darling & Hammond, 2009). Furthermore, Wei et al. (2009) found that sustained and intensive PD is correlated to student achievement gains.

O'Neill and Conzemius (2002) contended that schools that demonstrated continuous improvement in student results are characterized by teacher engagement in collaborative teams that are embodied in a culture that is characterized by a shared focus on student learning. The shared focus is evident in the reflective practices and collaborative partnerships of the teachers. Inger (1993) established that the inclusion of teacher collaboration in the school environment results in higher levels of student achievement and student behavior, when compared with

schools that did not incorporate teacher collaboration in their school structure. Traditional PD models have required the presenters to be the party responsible for “action,” while only requiring teachers to be in attendance (Chappuis, Chappius, & Stiggins, 2009). Moving forward, teachers on collaborative teams have the accountability to not only structure their own PD, but they are also responsible for the activities and behaviors that will propel their professional growth.

PLCs are more than a program to implement. PLCs and the implementation of collaborative teams represent a shift in the responsibility for professional learning. The research on collaboration as a means to develop teacher leadership capacity has promulgated the influence that teachers have to influence their peers toward improved educational practices (Gigante & Firestone, 2007). Little research exists that conveys what teachers actually do in a collaborative environment and under what conditions collaboration is most effective as a means of professional growth (Meirink, Meijer, & Verloop, 2007). The existing research suggests that student achievement is increased when teacher teams are aligned in a manner that allows teachers to collaboratively develop goals that are engrained in the daily curricula and instructional strategies delivered to students (Scribner, Sawyer, Watson & Myers, 2007).

Effective implementation of educational reform can be achieved. PD generally refers to ongoing learning opportunities available to teachers through their school (Dennen & Myers, 2012). The components of effectiveness, or what has worked in PD for teachers was embedded PD that had a direct relationship to the work of teaching (Desimone, 2011). Effective PD is often seen as vital to school success and teacher satisfaction, yet it has also been criticized for the high costs associated, the vaguely determined goals, and for the lack of data on the resulting school improvement. Typical PD activates include formal teacher induction, degrees earned as part of recertification or tied to salary movements, the national board certification process, and

participation in subject–matter associations (Sawchuk, 2010). A few examples of PD that are able to provide a positive impact on teacher learning include co-teaching, mentoring, reflecting on lessons, group discussions examining student work, and a teacher resource network (Desimone, 2011). Using online resources to create a self-directed inquiry accompanied with action research was yet another dimension of powerful teachers’ PD opportunities (Desimone, 2011).

Quantitative research on the impact of PD remains comparatively sparse as much of the research tends to be descriptive (Sawchuk, 2010). A 2007 review of more than 1,300 studies on PD conducted by researchers at the American Institutes of Research (AIR) found only nine studies of PD programs that met rigorous scientific standards set by the, What Works Clearinghouse, the arm of the federal Institute of Education Sciences that reviews experimental research on program impact (Yoon, Garet, Birman, & Jacobson, 2006; Sawchuk, 2010).

Desimone, Porter, Garet, Yoon, & Birman (2002) contend that successful PD follows these specific steps:

- Teachers experience professional development.
- The professional development increases teachers’ knowledge and skills, changes their attitudes and beliefs, or both.
- Teachers use their new knowledge, skills, attitudes, and beliefs to improve the content of their instruction, their approach to pedagogy, or both.
- The instructional changes that the teachers introduce to the classroom boost their students’ learning

Although Desimone (2009) reported on the specificities of the steps to garner effective PD experiences for teachers, Darling-Hammond and McLaughlin (1995) have identified the PD

strategies that have succeeded in improved teaching. The common features of these strategies are:

- experiential, engaging teachers in concrete tasks of teaching, assessment, and observation that illuminate the processes of learning and development;
- grounded in participants' questions, inquiry, and experimentation as well as profession wide research;
- collaborative, involving a sharing of knowledge among educators;
- connected to and derived from teachers' work with their students as well as to examinations of subject matter and teaching methods;
- sustained and intensive, supported by modeling, coaching, and problem solving around specific problems of practice; and
- connected to other aspects of school change.

These approaches allow teachers to be engaged in evaluating their practice and use their colleagues for peer support.

In summary, promoting a system of collaborative practices is a difficult but meaningful transition for teachers to make when focusing on the ultimate goal of a PLC focusing on continuous student achievement. Reeves (2008) has pointed to research that demonstrated to teachers that there is a positive correlation regarding student achievement on assessments when the faculty is engaged in collaborative team practices. When teachers are challenged to find simple answers to complex problems in a collaborative team setting, communities of practice are created that promote school change beyond the individual classroom to create the critical mass for changed problem solving at the school level. However, little research actually examines how best to implement and administer collaboration among teachers.

Learning Organizations

Learning organizations are not simply a fashionable trend, these types of organizations can provide work environments that are open to creative thought and embrace the concept that solutions to ongoing work-related problems are available inside each and every employee. The section begins with the definition of what a learning organization is and continues with the notion that educational leaders can learn from business leaders to transform each teacher to seek creative solutions to everyday problems. This section further develops the idea of encouraging teachers to become members of a creative, problem-solving team that utilizes a common vision as a tool for personal growth within the organization. Also presented in this section are the similarities that exist between Senge's (2000) idea of a learning organization and DuFour's (2005) concept of a PLC which also is related to Hord's (2004) PLC framework.

The concept Senge (2000) created was complete with the vision of an organization made up of employees skilled at creating, acquiring, and transferring knowledge. The concept is not a new one as learning organizations flourished in the 1990s, stimulated by Senge's *The Fifth Discipline* (1990). Organizations need to learn more than ever as they confront mounting forces to work together as teams. Such learning organizations would be able to adapt to the unpredictable quickly, have the ability to think critically and creatively, with the ability to communicate ideas and concepts to cooperate with others in the processes of inquiry and action (Senge, 2006).

Senge (1990) defined learning organizations as, "Organizations where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together" (p. 3). Senge's ideas provided school administrators and

business leaders the inspiration to believe in their employees' ability to learn and develop a successful organization. He argued, "Learning organizations are possible because, deep down, we are all learners" (p. 4)

Senge's (2000) learning organization theory has elements in common with those of a PLC, such as building a conceptual framework and then working together with colleagues to acquire new knowledge that promotes a common vision which utilizes reflection as a tool for personal growth. Systems thinking, according to Senge (1990), is defined as, "...a conceptual framework, a body of knowledge and tools that has been developed over the past fifty years, to make the full patterns clearer, and to help us see how to change them effectively" (p. 7). Senge's fourth discipline requires an all in attitude to build shared vision, which includes a collective commitment to the success of the shared vision, from every member of the organization. Like PLCs, Senge's (2000) notion of learning organizations describe teams learning beginning with dialogue and conversation to enable the members of the team to develop the capacity to think together.

PLCS are able to provide opportunities for teachers to look deeply into the teaching and learning process in order to learn how to become more effective in their work with students. The structure of PLCs is able to provide a context of collegiality, which supports teachers in improving their practice through learning new curriculum and instructional strategies and the methods for interacting meaningfully with each child. The newest focus on schools as "collaborative workplaces" and "communities of learners" has prompted teachers and administrators alike to rethink the role of professional learning and the value of collaboration as a means of professional growth (Robbins & Alvy, 2003).

Building on the idea of learning organizations as a key for future organizational success, DuFour (2005) asserted that collegial school improvement efforts have, at their core, three principal ideas:

1. The school's purpose is to ensure each child learns.
2. The school's staff must work in unison to achieve learning for all.
3. The routines of schools must be a collectively focused effort at improved student outcomes.

Similarly, Hord's (2004) development framework of the PLC exhibited some essential characteristics similar to DuFour's elements: (a) supportive and shared leadership, (b) shared values and vision, (c) collective learning and the application of that learning, (d) shared practice, and (e) supportive conditions for the maintenance of the learning community (p. 7).

Senge's learning organization theory, DuFour's collegial school improvement model, along with Hord's development framework of the PLC, all share the idea that in order to ensure that a learning organization thrives there must be a shared sense of purpose that is communicated, shared and embodied in the everyday structure of the work to be done. Building a shared vision enables the team's work to be focused on creating the right outputs. When vision meets a sense of purpose there is a shared belief that each worker's contribution matters to the overall success of the organization.

The Importance of Effective Collaboration

This section will build on the idea of collaboration as a key component of PLCs, as evidence suggests that schools struggle with supporting many aspects of developing PLCs (Hipp & Huffman, 2002). This will be accomplished by demonstrating that schools struggle with developing effective structures to support and maintain the successful implementation of the PLC design when traditional mindsets prevail (Hipp & Huffman, 2002). The idea of collaboration as more than a construct of time is developed in this section to show that just as

there are forms of collaborative structures, there are also forms of non-collaborative structures that exist. In order to recognize and implement quality PLC structures such as collaborative time, this section explores the features of an effective collaborative culture. Research has shown that PLC efforts are believed to be one of the most promising ways to improve student outcomes (DuFour, et al., 2004; Hord, 2004; Joyce, 2004), yet the understanding of the construct and the practical workings of PLCs remain elusive (Louis, 2007; Prestine & Nelson, 2005). As a result, this section will build the case to indicate there is a need to ensure that there is growth of teacher's perceptions and attitudes towards the development of effective collaboration as a model of professional development (PD) and to suggest effective methods of PLC implementation.

Effective collaboration may begin with meaningful PD and grow through the implementation of effective PLCs, but it will only thrive if the collaboration itself is deliberate and effective (Linder et al., 2012). In order to achieve this effectiveness, various factors of collaboration must be carefully considered, including the components of collaborative culture, the structure of effective collaboration models, and the importance of teacher beliefs. Each of these three components will be more fully developed. Collaborative school cultures are reinforced when the infrastructure is built on the development and implementation of norms, values, beliefs and assumptions (Schein, 2010). As schools build on the experiences of their faculty members (Beauchum & Dentith, 2004; Hargreaves, 2005), and support those same teachers through effective PD (DuFour & DuFour, 2013), effective schools emerge from collaborative practices (American Federation of Teachers, 2007; Learning Point, 2007; Lieberman & Miller, 2005). Teachers learn through both formal and informal structures as collegial relationships develop to enhance the professional growth of teachers.

Desimone et al. (2002) conducted a meta-analysis on the features of effective PD implementation. The consensus of the reported research concluded that the main features of PD that have been associated with changes in knowledge, practice, and student achievement includes the following features:

- Content focus-the subject matter and how students learn the content is critical
- Active learning-teachers should be doing the work such as observing, receiving feedback, examining student work, or presenting their own work
- Coherence-teachers learning should be consistent with their own knowledge and beliefs which should all be tied to local and state reform and policies
- Duration-PD should be a minimum of 20 hours over the course of an extended period of time rather than isolated incidents
- Collective participation-teachers should work with each other in like groups

“Fragmented individualism” is the term used to describe the school culture that exists when teachers practice in isolation, independent of each other (Hargreaves, 1994). Teachers working in isolation have the ability to work in a world where they create the laws, the culture, and even the climate of learning. Unfortunately, many teachers live in their isolated worlds, with little knowledge of what is happening in the classroom across the hall. According to Barth (1990), “Collegiality requires that everyone be willing to give up something without knowing in advance just what that may be. But the risks and costs of interdependence are nothing next to the risks and costs of sustaining a climate of emotional toxicity, of working in isolation” (p. 31). Fullan and Hargreaves (1991) identified four levels of collaborative or non-collaborative structures that exist within schools:

- *Balkanization* - a form of non-collaboration consisting of subgroups and cliques operating as separate entities
- *Comfortable collaboration*- a form of congenial collaboration where nothing too deep or controversial is expressed and nothing really changes in terms of resources, techniques, long-range goal setting or planning
- *Contrived collegiality* - a basic form of non-collaboration that ensures physical compliance but the conversation is superficial with nothing to show for the time
- *True collaborative cultures* - share a sense of purpose with support for each other to focus on long-term school improvement efforts complete with a network of people to share resources and solutions

One five-year, quasi-experimental investigation concluded that students in schools whose grade-level teams use an inquiry-focused protocol to solve instructional problems significantly increased student achievement over the comparison groups of schools where that structure was lacking (Gallimore, Ermeling, Saunders, & Goldenberg, 2009). Teachers attributed the achievement to their teaching rather than external causes due to an increased focus on solving the proposed academic problem (Gallimore et al., 2009). The research contends that time was spent on the development an instructional solution through teacher collaboration and focus. Seeing causal connections fostered acquisition of key teaching skills and knowledge, such as identifying student needs, formulating instructional plans, and the use of evidence to refine instruction (Gallimore et al., 2009). These outcomes were thought to be more likely when teams have stable settings in which to engage in continuous improvement (Gallimore et al., 2009).

Collaboration is such a powerful PD tool because the end goal is about transference of knowledge and ideas with co-workers. Arguably, transference of knowledge is the aim of any PD

outcome. Transfer accompanies the belief that it is better to broadly educate individuals rather than simply train them for isolated tasks (Bransford, Brown, & Cocking, 1999). Collaboration is about the sharing of ideas and extending learning from one context and applying it to another.

According to Hargreaves (1994), the development of relationships between colleagues and the collaborative time built into the school day are the fundamental factors in a collaborative culture. Effective collaboration causes working together to be accomplished at a higher level, interacting assertively with purpose. Hargreaves (1994) further elaborated on his definition of a collaborative culture by outlining the following characteristics:

- Collaborative time is both supported and provided by administration, but the collaborative team of teachers sustains it.
- Collaborative time is not forced because it is a need that will ultimately benefit teachers.
- Teachers develop specific goals for this time rather than given tasks to check off.
- Collaborative meetings are at a regularly designated time but it is the work that makes the meeting essential.
- Outcomes of collaboration are dynamic and unpredictable.

Once the culture of trust has been developed within the team, collegial relationships enable true collaboration between groups of teachers. Datnaw, Park, & Wohlstetter (2007), conducted a study of urban schools across the United States further supporting the importance of collegial relationships. Administrative support and a trusting faculty can enable the collaborative groups to interact like families. This means the group can trust, disagree and argue. Like Hargreaves's ideas on the components of collaboration, this study also emphasized a key factor in an effective collaborative culture is the element of regularly scheduled, and uninterrupted,

collaborative time. Teachers need to be able to prepare for their day while also believing that the collaborative time is unrushed and essential to their success. The culture surrounding collaboration must be a priority with minimized outside factors that could distract teachers from the purpose of the collaborative culture in order to be effective.

The National Staff Development Council (NSDC, 2013) identified common features of collaborative models that impact student achievement and affect many of the same elements present in Hargreaves, DuFour, and Hord's models:

- Collaboration time is built into the teacher's' work day
- PD is content specific for individual teachers
- Both formal and informal PD opportunities are extended to teachers
- New teachers are supported and involved in curricular, instructional and assessment decisions
- Supportive and shared leadership
- Shared personal practice

According to Hargreaves (1994), teacher collaboration may begin with something as simple as administrative support and time allotted for meeting, but ultimately it is the teacher's' commitment to growth that will sustain the desire to collaborate. The belief in “we” better than “me” is a fundamental concept in becoming a sustaining collaborative team member (Hord, 2004). Contributing to working as a team is both productive and beneficial to a teacher's personal professional growth in order to nurture a supportive and shared practice (Hord, 2004). Collaboration is an evolutionary process that enables teachers to establish the purpose and the work that must be done to implement the purposes of others. Scheduled meetings in the early

stages may characterize collaboration, but such sessions do not dominate the arrangements for working together.

In conclusion, the goal of much educational reform is to provide a culture of continuous learning for students. In order to provide that stimulus, teachers, too, need an environment that values and supports hard work, the acceptance of challenging tasks, risk taking, and the promotion of growth. Teachers' sharing their personal practice in a collegial manner in the midst of a collaborative culture contributes to creating such a setting.

Importance of Teacher Beliefs

The exploration of constrained risk taking begins this section in order to develop the notion that although there is freedom to develop innovative lesson plans, teachers need support to counteract the emotional lack of freedom they encounter during the implementation of new ideas and processes in the classroom. As the idea of constrained risk taking is developed in this section, the power of PLC collaborative teams is also developed to indicate a need for a system that will monitor the development of effective PLC structures to engage teachers in the implementation of PLCs that will develop strong practices to lead innovation and continuous student achievement improvement efforts. The focus of this section culminates with the importance of teacher beliefs toward innovation in the classroom and the power PLCs can provide to support teacher efforts. This concept is achieved by the development of the belief that teacher support has a powerful impact on their actions and the positive impact their actions have on student outcomes. Again, the section combines the ideology behind the importance of teacher beliefs to support the need for additional studies regarding the attitudes of teachers as school improvement initiatives such as PLCs are implemented in the K-12 school setting.

Interest in the relationship between student achievement and teacher practice is partly the result of an acknowledgement that the enactment of school reform processes is not the linear processes described by earlier theories about teaching and learning (Tyler, 2013), but rather the will of the teacher in the classroom. Increasingly, researchers such as Ball and Forzani (2009) suggest that teacher education falls short of the reality teachers encounter as teachers prepare their lessons on the basis of the tasks and activities which will maintain the flow of interaction in the classroom. The idea of change is both alluring and restrictive to teachers. For many teachers, a classroom can turn chaotic quickly if the newly implemented activities are not coordinated and timed precisely. For this reason, some teachers stay with what they know for far too long in a state of paralysis rather than trying something new (Little, 2003). Little (2003) referred to this state of constrained risk taking to identify teachers that have the ability but lack the confidence to explore alternate ways of teaching and learning. However dreadful this state of paralysis can be, PLCs can change this dynamic.

DuFour (2005) asserted, “The professional learning community model flows from the assumption that the core mission of formal education is not simply to ensure that students are taught but to ensure that they learn. This simple shift—from a focus on teaching to a focus on learning—has profound implications for schools” (p. 32). DuFour’s idea of promise, coupled with Little’s (2003) acknowledgement of constrained risk taking, defines the ways in which teachers are both free to be innovative but also may fear failure which constrains the ways teachers approach their work. As a result, since teachers ultimately impact student learning, any attempts at implementing new reforms, including collaboration, require considering teachers’ beliefs, otherwise the results can be unexpected and unwanted consequences. At the same time, however, collaborative schools have more satisfying and more productive work environments

(Fullan and Hargreaves, 1991), yet many teachers may not fully understand the power of collaboration in relation to what is most beneficial for students (Davis & Andrzejewski, 2008).

Education is a changing enterprise, and sometimes, teachers continue to teach in the ways in which they were taught without ensuring that the methods produce favorable outcomes for students. Teachers construct their work lives and careers differently from their counterparts in other occupations. This can be explained by examining the psychic rewards among teachers, as Lortie (1975) concluded that teachers perceive their psychic rewards as scarce, erratic and unpredictable. Lortie (1975) embraced the understanding that teachers have uncertainties in teaching which inhibit the feelings that future rewards are worthwhile enough to pursue which supports the position that it would be unwise to sacrifice the present opportunities for future possibilities in regards to individual teacher practices. The distinctive psychic qualities of teaching, be they rewards or annoyances (Hargreaves, 1999), are fundamentally wrapped up with how teaching is organized as an occupation. Teaching, Lortie (1975) claimed, is a flat career with long periods of working life spent at the same level of seniority which ultimately leads teachers to rely on their own resources remembering their life and the order of teaching as a student rather than as a professional. When these factors are combined together, there is little hope of innovation to offer, only strong prospects for persisting conservatism (Lortie, 1975). Lortie (1975) rationalized the lack of innovation in teaching by recognizing the conservative proclivities of teachers.

Success or failures of school improvement initiatives are not entirely dependent upon the initiative itself but also fail based upon the dedication and commitment of teachers to enable successful change (DuFour et al., 2004). Research supports the importance of meaningful, sustained PD opportunities on teacher effectiveness (Little, 2003; Hord, 2004; Marzano, 2009;

Hattie, 2012; DuFour, 2014). It is important to understand that teachers' experiences with meaningful PD, in place as PLCs, can actively increase the effectiveness of collaboration when it is understood and accepted. This in turn increases the perceived value of collaboration for teachers as an important mode of PD. For this perception to be positive, the use of job-embedded PD becomes a key component through the change process, ensuring that this PD is of greater duration, involving shared learning and community centered professional learning (Croft, Coggshall, Dolan, & Powers, 2010).

The intensity of PD required for a direct correlation to student achievement to be evident, ranges from 30 to 100 hours in a six to 12-month timeframe, which is a drastic contrast to the typical one-day or two-day workshops or conferences that teachers typically attend (Wei et al., 2009, p. 43). This time commitment is not a realistic goal without job-embedded PD being a priority. According to Robbins and Alvy (2003), a school's culture directly influences the PD activities, and if collaboration is forced and rushed, the culture is not going to be conducive to the success of the PD. When schools build a collaborative model of PD, considering teacher's beliefs in the development of structure, the change process becomes much more fluid and productive.

Educational reform is fraught with failures due to lack of teacher support that Handal and Herrington (2003) claim is attributed to the lack of consideration for teacher's beliefs during implementation. Similarly, Sarason (1990) asserted that schools have been intractable to change and the attainment of goals set by reformers have not been met. Furthermore, Sarason (1990) argued that each new wave of reform learns nothing from earlier efforts therefore developing recommendations that have previously failed. In order to counteract this stagnation, Elster (2010) pushed for efforts spent accounting for the time and resources needed to persuade and change

teacher attitudes and beliefs. According to Anderman and Kaplan (2008), teachers represent the most important aspect of change in the educational ecosystem. There is an ever-present counter argument that keeps teachers in a state of stagnation. Little (2003) argued that teaching, and teacher relationships, represent the force of tradition and the allure of innovation that are at play in the complex vernacular of teachers' everyday talk. At the same time, however, there is the assumption that belief has a powerful impact on actions. Believing in the power of collaboration, in connection to doing what is best for students, can enable the success of PLCs if teachers have a deep understanding of the positive impact their actions have on student outcomes.

In summary, teachers are submerged in a dynamic undertaking with few resources to create the appropriate learning environment for students. As Lortie (1975) pointed out, the psychic rewards teachers perceive are scarce, erratic and unpredictable which has caused teachers to develop uncertainties in implementing teaching innovations. These feelings in turn cause an inhibition in teachers that limits the belief in possible future rewards as being worthwhile enough to pursue (Little, 2003). Since teachers demonstrate constrained risk taking (Little, 2003) when it comes to exploring alternative methods of teaching and learning, the ultimate impact is that attempts at implementing new reforms are thwarted by teachers. In accordance with Fullan and Hargreaves (1991) conclusion that collaborative schools have a more satisfying and more productive work environment, it is equally important to consider Elster's (2010) belief that before there is an expectation of teacher action, there should be considerable effort put into developing the time and resources to alter teacher attitudes and beliefs. The significance of this section lies in the understanding that teachers are more likely to move towards action when feelings of support and time are given to the implementation of the school improvement initiative with consideration for teachers' current beliefs. This awareness further supports the need for

additional studies to investigate the progression of teacher attitudes during the implementation phase of a school improvement initiative such as a PLC.

Missouri Professional Learning Communities (MPLC) Project

The process of PD implementation is an issue that is closely allied to teachers' attitudes towards the initiative being introduced. Just as education involves teaching and learning, so does the implementation of PD, as the ultimate goal of any set of initiatives must be related to changing what teachers do. The discussion of PD that impacts student achievement raises the equally important issue of how changes are likely to be accomplished. As research on PD in the past few decades has shown, implementation can involve any number of complex processes (Penuel, Fishman, Yamaguchi, & Gallagher, 2007). The discussion in the following section of this paper will cover the goals of the MPLC Project, the implementation of PLCs as introduced through the MPLC Project training, and a description of the lengthy process involved in implementing the three domains and associated practices of the MPLC Project to the participants from the nine regions in the state of Missouri. This section is a detailed account of the MPLC Project induction process. The MPLC Project is one method of PLC induction into a K-12 school setting that includes a process for monitoring teacher attitudes from induction of the initiative through the performance stages of the induction process.

The goal of the MPLC Project is to increase student achievement by building the capacity of teachers and administrators to create and sustain a school culture that promotes high levels of student and adult learning (Burns, 2010). PD of greater duration is offered to participating schools in the MPLC Project through various stages of commitment by the school building and the district. The RPDC resource specialists collaborated to refine the essential PLC curriculum to help schools develop a strong PLCs framework. This curriculum organizes the essential

components of the MPLC curriculum into eight specific strands (Burns, 2010). In the spring of 2010, the Leadership and Learning Center conducted a study of Missouri's school-improvement initiatives where it was determined that PLCs appear to have the greatest potential impact on student achievement (Burns, 2010) when all eight strands of the MPLC Curriculum were implemented. The eight strands that form the MPLC curriculum are:

1. Foundation for Learning Community Culture
2. How Effective Building-level Leadership Teams Work
3. Administrative leadership
4. How Effective Teams Work
5. What Students Need to Know and Do-Curriculum
6. Assessment For/Of Learning
7. Systematic Process for Intervention/Student Success
8. Continuous improvement

The leadership team in the MPLC Project resembles Fullan's (2010) description of the role of leadership which is to 'cause' greater capacity in the organization in order to get better results. The eight strands of the MPLC Curriculum were created to facilitate the sustainability of PLC's through shared leadership. The effectiveness of the leadership team is critical to the successful implementation of PLC's, and the focus on each of the eight strands is intended to deepen the implementation of the MPLC mission, vision and values (Gordon, 2014). School leadership, following the ideology incorporated into the eight strands of the MPLC curriculum, is embedded in the school community as a whole rather than roles that are based on a discrete set of individual behaviors based upon job title (Burns, 2010). Such a broadening of the concept of leadership suggests shared responsibility for a shared purpose of community (Hirsch, 2012).

The MPLC used two instruments to assess perceptions of teachers and administrators relative to the eight strands of the MPLC curriculum in order for schools to implement PLCs to a deeper level (Burns, 2011). The first tool, the IR, a formative assessment tool, was utilized to assist schools in being proactive in self-monitoring their work rather than relying on data that comes too late in the learning process (Burns, 2011). The second tool, the BAT, is the collection tool utilized in this study which provided an efficient system to collect annual data utilized for monitoring and assessing PLC implementation practices (Burns, 2011). The two tools, the IR and the BAT, are used in conjunction with the MPLC Project training so that resource specialists have formative data to use intermittently during the training sessions. The BAT registered information for teachers in two subgroups. The first subgroup was labeled as the Collaborative Team (CT) teachers. The CT teachers did not receive direct instruction from the resource specialists, however, the CT participated in grade level, content, or other types of PLC collaborative teams. The second group is the Leadership Team (LT). The LT participated in direct instruction with the resource specialists. Typically, the LT is composed of 4-8 teachers, plus at least one special education teacher and the building principal (Marzano, Waters, & McNulty, 2005). The LT is intended to represent each department or grade level within the school building. The LT teachers were saddled with the task of bringing the practices back to the building level to the CT group and presenting the training in a train the trainer model of implementation. The LT trains the CT group for the duration of the MPLC Project implementation training. The events that comprise the MPLC Project curriculum will be discussed later in this review.

Once a written partnership agreement is established between the RPDC and the school district, a MPLC Project resource specialist from the RPDC begins to work with the leadership

team to address the current reality to get a feel for the likelihood of success in becoming a school that will achieve the deep implementation marks on the BAT and the IR. Schools involved in the structured four year MPLC training are identified as Active Level schools. Schools at the Active Level are schools that are currently participating in the MPLC Project attending the training sessions and completing the IR and the BAT assessment tools. Each Active Level school participating in the MPLC Project commits to a four-year process that includes a training curriculum, on-site support, technical assistance and implementation assessments (MPLC BAT, 2012). Each Active Level school maintains a leadership team, which consists of the principal and representative teachers. Once established, the leadership team engages in a four-year training process with the PLC consultants from their RPDC region to guide the team through the PLC implementation process. The MPLC training regimen generally involves at least eight contacts with each school throughout the year. During the inaugural year, there are typically two additional meetings focused on the formation of team norms and mission, vision, and value statements that will guide the work of the leadership team. Four of the annual school contacts are leadership team trainings that specifically address the eight strands of the MPLC curriculum. Additionally, there are three on-site visits by regional PLC consultants that provide school based coaching and support.

As a part of the MPLC training, schools receive ongoing onsite support in addition to the curriculum training. The purpose of the on-site visits are to provide a more personal level of support to make connections with the leadership team and other leaders in order to establish positive relationships for the development of a system-wide PLC infrastructure. Site visits can also aid in personalizing the learning from prior PD sessions that allow the resource specialist to conference individually, coach the leadership team, consult with collaborative teams or provide

whole group PD sessions on specific needs. Regional PLC Consultants meet with administrators, leadership teams, and sometimes all staff members to provide coaching, monitoring, and expertise (MO PLC Implementation Rubric, 2012). At some point in the process, generally the spring of the third year, a daylong onsite review occurs. The IR is used to guide the full day onsite review of each building. A schedule is developed for the day, which includes:

- Focus Group Interviews (leadership team, teachers, students)
- Review of Artifacts which detail the building's PLC journey
- Observation of PLC Collaborative Groups/Classroom instruction
- An exit conference, where the Leadership Team and regional PLC Consultants agree upon levels of implementation.

Schools in need of targeted differentiated PD for their LT can select from a variety of training opportunities provided by the MPLC project. Although ongoing training is typically provided to the LT, the RPDC resource specialists are available to do a mini-session on site for the entire staff of a building. There are four basic levels of support that schools receive as part of the MPLC Project PD from their RPDC (MO PLC Implementation Rubric, 2012):

1. Inquiry/Awareness Level-Schools can “tip their toe in the water” and learn more about the MPLC Project by participating in an overview presentation and receiving technical assistance from an RPDC specialist, which generally turns into a secured commitment at both the building-level and the district-level to commit to the PLC process.
2. Active Level-The active level is where the learning and norming of PLC processes and procedures occurs and is generally a three to four-year commitment. Schools at the active level participate in the training curriculum while also hosting on-site visits and

accepting technical assistance and support through resources, and self-assessments such as the BAT analysis and the implementation rubric (IR) audits.

3. Continuous Improvement Level-Schools, that are still committed to the PLC process, yet do not meet the target of proficient or deep implementation levels on the self-reported indicators, are able to receive targeted and differentiated supports from the MPLC specialists. Methods the MPLC specialists will utilize may consist of providing extra resources, specific, more differentiated trainings, and conducting on-site visits, if the building and district commitments are secured to ensure fidelity to the implementation model will be guaranteed. Schools that elect to partake in support at this level may be committed to the MPLC Project for an additional one to two years.
4. Sustaining School Level-Schools, that achieve the target rating of proficient or deep implementation levels on the self-reported indicators, are simply self-monitored by annual implementation assessments. Deep implementation is achieved by meeting all of the indicators in each of the previous ranges. Schools in the Sustaining School status level may qualify for the Exemplary PLC School status, which is recognized by the Missouri Department of Elementary and Secondary Education (DESE) office. The criteria of success are established by the MPLC Project utilizing MSIP 5 achievement standards of “On Track” in each of the achievement categories in ELA and Math total and subgroup, and schools self-report their perceived implementation assessments, such as the IR and the BAT, while also demonstrating evidence of practices in action and their student achievement data.

Overall, the goal of the MPLC Project is for each school that has completed the three-year training to reach the “deep implementation” status for PLCs as self-assessed on the IR and

the BAT. The Active Level schools completing the training through support from the regional consultants yet still rating themselves as not yet achieving proficient implementation in all 46 indicators on the MPLC IR are considered “Continuous Improvement” schools. Schools that have achieved “Deep Implementation” or “Proficient” self-ratings on all 46 indicators are identified as “Sustaining” PLC schools.

Data are also gathered and examined regarding the building demographics, communication processes, and student achievement data in order to fully assess the readiness and commitment level of the building. The readiness and commitment level of the building is based in large part upon a pledge from the building administrator and the leadership team members to attend and implement the eight strands of the MPLC curriculum and attend the training sessions. Building administrators are required to attend leadership team trainings as part of the partnership agreement, and are strongly encouraged to participate in specific administrator trainings at least twice per year.

In summary, this section reviewed the MPLC Project program that is driven by the idea that effective leadership teams are critical to the success of the PLC movement. Leadership teams influence change and growth within their respective buildings beginning with adequate representation from grade levels and disciplines to voice a wide range of perspectives (Lambert, 2003). Membership on a leadership team is most effective when it consists of a building principal, a minimum of four credible teacher leaders with strong interpersonal relationships, and a representative from the Special Education department (Marzano et al., 2005). The role of the teacher on the leadership team is to have regular communication with the staff on matters of curriculum, instruction, assessment and the progress of the PLC process. Teachers’ attitudes and behaviors matter in the implementation of a school initiative. The IR and the BAT data are

utilized at the building level to determine the ebb and flow of the PLC curriculum as teachers' behaviors and attitudes change to more closely align with benchmarks and actions embedded within the three domains of collaboration, teacher learning and student learning.

Summary

This literature review suggests there is a significant gap in the research as to the processes in which teachers engage to change their perceptions and attitudes during the PLC implementation and training phases. This literature review showed that the main objective of a PLC is a continuous improvement of student's results by teachers continuously seeing and sharing information followed by action steps based upon what they have learned. The implementation of a collaborative culture begins with the implementation of effective PD, directing teachers to the needed changes. Hargreaves (1994) suggested that the benefits commonly associated with collaboration include improved effectiveness, reduced overload, increased capacity for reflection and organizational responsiveness take time to develop. As Lortie(1975) pointed out, the psychic rewards teacher perceive are scarce, erratic and unpredictable, which has caused teachers to develop uncertainties in implementing teaching innovations. These feelings in turn cause an inhibition in teachers that limits the possible future rewards as worthwhile enough to pursue (Little, 2003). This can be aided by successful implementation of PLCs by teachers who have had the training to understand the process, which will result in a change of teacher attitude, which is ultimately the key factor of effective collaboration (CCSRI, 2006).

The culture of a learning organization provides opportunities to develop teachers' collaborative skills to enhance student achievement and teacher learning (Burns, 2010) and continue the reflective process toward sustained school improvement (DuFour & Eaker, 2005).

Senge's ideas provided school administrators and business leaders the inspiration to believe in their employees' ability to learn and develop a successful organization. In a PLC, all members of the organization learn together and engage in professional renewal (Fullan & Hargreaves, 1991). The integral process of collaboration is woven into every aspect of PLC development and sustainment. Fullan (2005) emphasized that schools must realize the complexity of the change process and engage the collective capacity of the organization to achieve a focus on learning. Organizations do not change, people do (Fullan, 2005).

PLC efforts are believed to be one of the most promising ways to improve student outcomes (DuFour et al, 2004; Hord, 2004; Joyce, 2004), yet the understanding of the construct and the practical workings of PLCs remain elusive (Louis, 2007; Prestine & Nelson, 2005). PLCs have emerged as an effective school improvement model to increase student achievement as well as teachers' individualized PD needs.

The idea of change is both alluring and restrictive to teachers. For many teachers, a classroom can turn chaotic quickly if the newly implemented activities are not coordinated and timed precisely. For this reason, some teachers stay with what they know for far too long in a state of paralysis rather than trying something new (Little, 2003). Teaching, Lortie (1975) claimed, is a flat career with long periods of working life spent at the same level of seniority which ultimately leads teachers to rely on their own resources remembering their life and the order of teaching as a student rather than as a professional. When these factors are combined together, there is little hope of innovation to offer, only strong prospects for persisting conservatism (Lortie, 1975).

The discussion of PD to impact student achievement raises the equally important issues of how change is likely to be accomplished. The goal of the MPLC Project is to increase student

achievement by building the capacity of school personnel to create and sustain a school culture that promotes high levels of student and adult learning (Burns, 2010). PD of greater duration is offered to participants in the MPLC Project through various stages of commitment by the school building and the district. Data on teachers' perceptions of behaviors and attitudes on PLC structures continue to be lacking. This literature review suggests there is a significant gap in the research regarding the processes in which teachers engage to change their perceptions and attitudes during the PLC training. This research aims to examine teacher perceptions within the domains of collaboration, teacher learning and student learning before schools begin the implementation of PLC efforts by filling a void in the apparent lack of quantitative research on the topic of PD. Even through the stringent lens of AIR, teachers participating in collaborative PD opportunities are able to demonstrate success. Only a handful of studies have examined newer, site-based approaches to PD through a quantitative lens such as this study.

CHAPTER THREE

Methodology

Research Design

The purpose of this study is to examine teachers' self-reported perceptions regarding implementation of the program and the three domains of the MPLC Project training from year one of implementation through year three of the program. The investigation was specifically focused on the differences in levels of perception of the training based on year of participation in the MPLC Project. The MPLC Project includes embedded PD and data tracking utilizing an informal formative IR and a formal, annual summative BAT to gauge the success of program implementation based on three domains: collaboration, teacher learning, and student learning. The BAT was developed in cooperation with the University of Missouri-Kansas City Institute for Human Development (Jenson & Day, 2016). This chapter provides a description of the techniques used in this study, the descriptive research design, and the analysis of the survey data collected.

Research Questions

The four research questions addressed the data that were collected utilizing the BAT survey instrument. The research questions include:

Research Question One: Are there perception differences on the level of PLC implementation as measured by the BAT between the leadership team (LT) teachers that received direct instruction from the MPLC resource specialists and the collaborative team (CT) teacher population from year to year of the MPLC Project training?

Research Question Two: Are there perception differences on the level of PLC implementation as measured by the BAT for the leadership team (LT) teachers that received

direct instruction from the MPLC resource specialists and the collaborative team (CT) teacher population from the beginning of the MPLC Project training to the end of the MPLC Project training?

Research Question Three: Are there notable perception differences on the level of PLC implementation as measured by the BAT that exist year to year between the leadership team (LT) teachers that received direct instruction from the MPLC resource specialists versus the collaborative team (CT) teacher population based upon the grade configuration of the respondent's school?

Research Question Four: Are teachers' perceptions on the level of PLC implementation as measured by the BAT more responsive to training towards one domain over another regarding the influences of the MPLC Project training on the domains of collaboration, teacher learning and student learning from the initial year to the final year of the PLC implementation process?

Research Design and Procedures

This research was conducted utilizing a cross-sectional survey design over a period of three years. Information was gathered over a three-year period of time beginning FY2013 concluding FY2015. Data collection occurred annually in an electronic format during a window of time from late January to late February. The aim of the surveys was to collect data and examine the changes in teachers' perceptions with the data gathered in a cohort study. The data that allowed the researcher to study PLC implementation were provided by the MPLC Project working in conjunction with the RPDC centers under the sponsorship of the Missouri DESE. Permission to use the BAT instrument results was requested from both Rob Gordon, Director of the MPLC Project and Michelle Smith, Data Coordinator for the MPLC Project. The request to use the data was granted via email by Michelle Smith on Monday, March 26, 2015 (see appendix

B). The BAT survey tool was developed in cooperation with the University of Missouri-Kansas City Institute for Human Development (Jenson & Day, 2016). The data procurement was accomplished through a raw data file incorporating the use of a descriptive rating, Likert-type survey. Utilizing the survey collection tool methodology allowed for a statistical analysis of the data. The unit of analysis was the teacher participants.

The data instrument utilized in the MPLC Project is the BAT. The BAT measures teachers' attitudes and behaviors relative to the MPLC Project's three domains of collaboration, teacher learning and student learning in an annual online survey instrument (Burns, 2010). In addition to the three domains, the BAT collects information in three subgroups; school administrators, teacher leadership team members (LT), and general education teachers that participate in collaborative teams (CT) (Gordon, 2013). The BAT begins with three demographic questions that indicate the respondent's primary role; a descriptor of the type of involvement the individual has in the PLC implementation process; and, finally, the RPDC region in which the training is delivered from. The 15 item PLC staff survey is designed to be completed by instructional staff who participate in a PLC collaborative team. PLC collaborative team members complete a total of 18 responses. In addition to the 15 item PLC staff survey, the LT also completes the 12 item leadership team survey for a total of 30 questions. This study only analyzed the common 15 item PLC staff survey questions. The 15 item PLC staff survey is constructed with three conditional options ranging from yes, partially, to no regarding the specific PLC practices surveyed. The BAT was developed in cooperation with the University of Missouri-Kansas City Institute for Human Development (Jenson & Day, 2016). The BAT was field tested in February 2010 and began full administration with MPLC Project schools the spring of 2011 (Jenson & Day, 2016). The results of this annual assessment provide schools with

feedback on their implementation progress, as well as statewide data on school levels of PLC implementation. The BAT was used to collect data from the nine RPDCs to provide overall implementation data about the status of Missouri's PLC reform efforts.

Participants Demographic Data

The BAT survey consists of a predetermined set of questions that is given to a purposive sampling of teachers and administrators in Missouri schools that have acquired membership in the MPLC Project. Although there is an administrative component to the survey instrument the sample population for this study is limited to teachers. The survey respondents are from a mix of schools with varying socioeconomic backgrounds, grade level configurations, and geographic regions. The MPLC Project resource specialists provided tools and direct instruction to the LT teachers and the building administrators for each of the participant schools' members.

Typically, training in the MPLC Project involves cohorts of leadership teams and administrators that represent their building who will deliver the information they received in a train the trainer model of implementation with most of the structured trainings conducted on-site (Gordon & Smith, 2015). Teachers completing the BAT represented one of two subgroups; teachers were either in the Leadership Team (LT) group or in the Collaborative Team (CT) group. The LT participated in the MPLC Project training and received direct instruction from the resource specialists. The CT teachers received training from one of the LT teachers in a train the trainer model of PD.

The MPLC Project Data Coordinator shared a total of 9,362 BAT surveys from 657 school buildings, however, only 7,005 surveys were submitted from schools that met the three-year participation criteria in the MPLC Project PD program. Of those eligible surveys, only completed surveys were used in the data reporting procedures allowing 6,650 completed BAT

surveys to be utilized to report teacher attitudes in the three domains of collaboration, teacher learning and student learning. Thus, 94.9% of eligible surveys were used in this analysis that could be assumed to be members of a longitudinal cohort for this study.

Respondents were matched by region, grade configuration and year of participation to assemble a cohort of teachers to track longitudinally through the PLC implementation process. Once potential participants were identified, the school was referenced with the information from the Department of Elementary and Secondary Education for teacher attrition to be lower than 18%. Schools with attrition greater than 18% were not included for this study due to an overtly high amount of loss of participants.

The BAT survey only contains three demographic questions. The BAT is designed to keep members' responses anonymous and was only able to reveal the respondent's primary role, a descriptor of the type of involvement the individual has in the PLC implementation process and finally the RPDC region in which the training is delivered from. The table in appendix C describes the characteristics of the respondents to include data which indicates that this study is dominated by an elementary influence which is representative of the teacher population in Missouri. There are a total of 64,866 K-12 public education teachers in the state of Missouri in which 50% are elementary, 18% are middle school or junior high teachers, and 31% high school teachers (MO School Directory, 2016). Roughly half, 49%, of the CT and over half, 52%, of the LT are elementary. The middle school represents upwards of 20% of the respondents while the high school makes up practically a third, 30%, of the CT yet only comprises 25% of the LT. The respondents reflect the state of Missouri's teaching population by school level.

Instrument Reliability Analysis

The BAT was designed to assess the level of PLC implementation in three domains: collaboration, teacher learning, and student learning. The table in appendix D contains a summary to validate the reliability of the data collected from the BAT instrument. The BAT survey instrument was developed in a partnership between the Missouri Department of Elementary and Secondary Education Department of School Improvement and the University of Missouri-Kansas City Institute for Human Development (Jenson & Day, 2016), an outside contractor procured by the MPLC Project administrators. The BAT was refined using school data from 208 MPLC Project schools with 2574 completed staff surveys from FY2013. The overall reliability of the BAT was evaluated at $\alpha = 0.89$ for the CT respondents and $\alpha = 0.85$ for the LT respondents (Jensen & Day, 2016). It was also noted that there was no indication that deleting any of the items would increase the reliability of either measure (Jensen & Day, 2016). Item statistics indicated that the items were all positively skewed since the critical ratios (CR) were all greater than 3.00 (Jensen & Day, 2016). This bias could be attributed to the limitation described earlier; respondents wanted their school's PLC to be viewed positively. Item S10 was omitted from the study due to its sole appearance in the 2010 BAT survey. Item S10 did not appear in subsequent years.

The BAT was field tested in February 2010 and began full administration with the MPLC Project schools the spring of 2011 (Jenson & Day, 2016). Of those 32 schools, 94% also scored at the proficient or above level on the BAT indicating to Jenson and Day (2016) that the BAT is a valuable tool for schools in assessing their PLC work in the early years of implementation also allowing leadership teams to target areas of need early in the process in order to implement at deeper levels (Gordon, 2013). To score in the proficient or above range, 80% of the respondents

must indicate yes there is agreement for each benchmark. The respondents selected from one of the three choices of Yes, Partially, or No in response to each of the 15 questions. Individual teachers in schools participating in the MPLC Project completed the survey annually during the MPLC Project implementation. Administration of the BAT is via the online tool, Qualtrics. The BAT contains three segments which collect information describing the collaborative culture and practices in the school based on perceptions from administrators, LT teachers, and CT teachers. Administrative results are not used in this study. This study analyzed the teachers results of the LT and the CT teacher groups that were obtained utilizing the BAT instrument during FY 2012-2013, FY 2013-2014, and FY 2014-2015.

Overall, the PLC BAT (see Appendix A) is constructed to measure the development of five specific features of a PLC (Burns, 2010): 1. Assess established PLC characteristics, 2. Identify areas for improvement, 3. Boost consciousness of a results-oriented culture, 4. Assess progress towards the three domains of a PLC model-collaboration, student learning and teacher learning and finally, 5. Focus efforts to develop a PLC that is focused on student achievement and behavioral support.

Data Collection/Research Procedures

The MPLC Project director and data coordinator volunteered their data for this research. The researcher contacted the MPLC director to gain permission and access to the statewide data. All data were compiled in raw format to avoid identifying any particular school in any of the research findings. The information utilized from this data set allowed the exploration of how PLC training influences the three domains and 12 benchmarks of professional learning as identified by 32 individual practices in the MPLC Project training. Of the 32 individual practices, only 15 will be evaluated as part of the study. There are 12 practices shared by the

leadership team teachers and the administrative team as well as five practices dedicated to administrative practices that are not part of the study.

This study is focused on measureable teacher perceptions. Table 1 depicts how the survey was constructed to gather information relating to key practices relative to the three domains which are outlined by 12 specific benchmarks. The omitted questions gathered from each survey period from FY 2013 through FY 2015. The MPLC director and data coordinator volunteered their data to this research study for the unbiased analysis of data. All data were compiled in raw format to avoid identifying any particular school, or region, in any of the research findings.

Table 1 Stratification of Questions

Question Number	Domain	Benchmark	Specific Practice
4	Collaboration	School mission and vision was collaboratively developed to focus on student learning.	Mission and vision guides decisions and actions of school, focusing on student learning.
5		There is consensus among faculty/staff that PLC is an effective mechanism for focusing school improvement to results in improved outcomes for students.	Belief among staff/faculty that PLC can be effective.
6		The school-side collaborative climate promotes sharing, reflection, and mutual support.	Teams encourage sharing of ideas.
7			Teams celebrate successes.
8		Teachers and administrators engage in shared decision-making.	Teams are involved making school-side decisions.
9		PLC collaborative teams organize their collaboration by relying on a schedule of meetings, planned agendas, and teaming norms.	Schedule allows time for frequent and regular collaboration.
10			Teams use agendas, norms, and team protocols to organize and monitor team work.
11	Teacher Learning	PLC collaborative teams systematically monitor and review their teaming practices.	Meeting records and other team monitoring tools are used to monitor teaming practices at least 3 times/year.

12		PLC collaborative teams make reflection upon effective teaching practices and engagement in shared learning a priority.	PLC team plans time to discuss effective teaching and teaching challenges.
13	Student Learning	Student achievement data is used for defining problems and designing solutions.	Team uses student data to drive problem-solving and decisions.
14			Team establishes and implements SMART goals based on student data.
15		PLC teams collaboratively identify and develop essential learning outcomes.	Teams collaboratively identified essential learning outcomes.
16		PLC teams collaboratively identify, develop and administer instructional strategies for addressing essential learning outcomes.	Teams collaboratively identified instructional strategies for addressing essential learning outcomes.
17		PLC teams collaboratively identify, develop and administer common formative and summative methods for assessing essential learning outcomes.	Teams collaboratively identified common formative and summative assessment methods for assessing essential learning outcomes.
18		PLC teams implement a school-wide system of matching the intensity and focus of student interventions with data identified needs.	Team members have clear understanding of how to use tiered interventions.

The four research questions were examined using descriptive statistics including means, P two-tail values and t critical two-tail values using an alpha of 0.05. Independent t-tests assuming unequal variances were used when evaluating groups since the model assumes that a difference in the mean score of the collaborative teachers could be found because of the influence of the leadership team teachers. Unequal variances were assumed since it was not determined if the variances were the same prior to analyzing the data. The independent samples t-tests were employed to determine if there was sufficient evidence to suggest that the MPLC training changed attitudes utilizing the train the trainer model of PD. Teachers' perceptions of implementation were recorded with values assigned from the BAT survey tool annually. The independent samples t-tests were selected for this study because it was the most

appropriate statistical tool to use due to the lack of individual identification for participants. If the identification of participants and similar other demographic data would have been available other statistical methods could have been used.

Data Analysis

Sequentially, the quantitative data from the 15 PLC staff questions were collected and analyzed. Both CT teachers and LT teachers answered the 15 PLC staff survey questions. The calculations directed by Ciarocco's (2010) practice examples of hand calculation of t-test for Independent Means was used for the quantitative analysis of each of the independent sample T-tests through the use of manually entered Microsoft Excel formulas created by the researcher. A Bonferroni adjustment was utilized to reduce the opportunity for type one statistical errors that yielded positive results that were acquired by chance due to the large numbers of T-tests performed. Table 2 depicts the adjustments that were made as part of the statistical analysis for this data set. This research study analyzed four research questions which entailed 47 independent t-Test calculations within 42 data-sets. The Bonferroni adjustment was executed by dividing the critical P value (α) by the number of comparisons being made. The statistical power of the study was calculated based upon the modified P value (α).

The mean for each question was calculated by assigning the value of 1 to all yes or A responses, the value of 2 to all partial or B responses, and the value of 3 to all No or C responses. A lower mean is indicative of higher levels of agreement based on these assigned values. These responses were then averaged individually by question based on membership in CT or LT. Survey data were checked for completeness and paired by such factors as year of training, RPDC membership, school configuration, participation type and domain. The raw information was then imported from .CSV files into Microsoft Excel to analyze the data. The data from the survey

Table 2 Bonferroni Adjustment

Dataset	# t-tests Conducted	N	Critical t-value for Selected α Level	Bonferroni Adjusted α	Adjusted Critical t-value
CT-Year 1	2	1604	1.960	0.05/2=0.025	2.327
LT-Year 1	2	443	1.960	0.05/2=0.025	2.327
CT-Year 2	1	1848	1.960	0.05/1=0.05	1.960
LT-Year 2	1	544	1.960	0.05/1=0.05	1.960
CT-Year 3	2	1706	1.960	0.05/2=0.025	2.327
LT-Year 3	2	505	1.960	0.05/2=0.025	2.327
Elem CT-Year 1	3	975	1.960	0.05/3=0.0167	2.452
Elem LT-Year 1	3	277	1.960	0.05/3=0.0167	2.452
Elem CT-Year 2	3	871	1.960	0.05/3=0.0167	2.452
Elem LT-Year 2	3	275	1.960	0.05/3=0.0167	2.452
Elem CT-Year 3	3	669	1.960	0.05/3=0.0167	2.452
Elem LT-Year 3	3	228	1.960	0.05/3=0.0167	2.452
MS CT-Year 1	3	268	1.960	0.05/3=0.0167	2.452
MS LT-Year 1	3	82	1.990	0.05/3=0.0167	2.507
MS CT-Year 2	3	437	1.960	0.05/3=0.0167	2.452
MS LT-Year 2	3	135	1.984	0.05/3=0.0167	2.496
MS CT-Year 3	3	415	1.960	0.05/3=0.0167	2.452
MS LT-Year 3	3	120	1.984	0.05/3=0.0167	2.496
HS CT-Year 1	3	361	1.960	0.05/3=0.0167	2.452
HS LT-Year 1	3	84	1.990	0.05/3=0.0167	2.507
HS CT-Year 2	3	540	1.960	0.05/3=0.0167	2.452
HS LT-Year 2	3	134	1.984	0.05/3=0.0167	2.496
HS CT-Year 3	3	622	1.960	0.05/3=0.0167	2.452
HS LT-Year 3	3	157	1.984	0.05/3=0.0167	2.496
CT Year 1-Collaboration	2	1604	1.960	0.05/2=0.025	2.327
LT Year 1-Collaboration	2	443	1.960	0.05/2=0.025	2.327
CT Year 2-Collaboration	1	1848	1.960	0.05/1=0.05	1.960
LT Year 2-Collaboration	1	544	1.960	0.05/1=0.05	1.960
CT Year 3-Collaboration	2	1706	1.960	0.05/2=0.025	2.327
LT Year 3-Collaboration	2	505	1.960	0.05/2=0.025	2.327
CT Year 1-Teacher Learning	2	1604	1.960	0.05/2=0.025	2.327
LT Year 1-Teacher Learning	2	443	1.960	0.05/2=0.025	2.327
CT Year 2-Teacher Learning	1	1848	1.960	0.05/1=0.05	1.960
LT Year 2-Teacher Learning	1	544	1.960	0.05/1=0.05	1.960
CT Year 3-Teacher Learning	2	1706	1.960	0.05/2=0.025	2.327
LT Year 3-Teacher Learning	2	505	1.960	0.05/2=0.025	2.327
CT Year 1-Student Learning	2	1604	1.960	0.05/2=0.025	2.327
LT Year 1-Student Learning	2	443	1.960	0.05/2=0.025	2.327
CT Year 2-Student Learning	1	1848	1.960	0.05/1=0.05	1.960
LT Year 2-Student Learning	1	544	1.960	0.05/1=0.05	1.960
CT Year 3-Student Learning	2	1706	1.960	0.05/2=0.025	2.327
LT Year 3-Student Learning	2	505	1.960	0.05/2=0.025	2.327

instruments were summarized using descriptive statistics to explain trends to indicate general tendencies in the data, the spread of scores and a comparison of how one factor relates to all others. The descriptive statistics were generated on each item comprising the BAT in response to the four research questions.

Research Question One: Are there perception differences on the level of PLC implementation as measured by the BAT between the leadership team (LT) teachers that received direct instruction from the MPLC resource specialists and the collaborative team (CT) teacher population from year to year of the MPLC Project training?

To find overall trends from year one to year two to year three during the researched period, there was a yearly comparison of LT v CT in an independent sample T-test to indicate a difference in scores based upon receipt of direct instruction (LT) or secondary instruction (CT). Two different groups are being compared in research question one. There were three sets of independent sample T-tests for research question one.

Teacher Group-Year of Implementation

- Independent sample T-test CT v LT- Y1
- Independent sample T-test CT v LT- Y2
- Independent sample T-test CT v LT- Y3

Research Question Two: Are there perception differences on the level of PLC implementation as measured by the BAT for the leadership team (LT) teachers that received direct instruction from the MPLC resource specialists and the collaborative team (CT) teacher population from the beginning of the MPLC Project training to the end of the MPLC Project training?

To find overall growth in teacher perceptions for the cohort of teachers (LT) receiving direct instruction compared to the cohort of teachers (CT) receiving secondary instruction during the researched period, there was an independent sample T-test for the LT teachers' mean scores for comparing year 1 and year 3. The same independent sample T-test was performed for the CT teachers' mean scores for comparing year 1 and year 3. The comparison was the CT group's progression from year 1 to year 3 comparing the CT group's progression in year 1 to itself in year 3. The comparison was the LT group's progression from year 1 to year 3 comparing the LT group's progression in year 1 to itself in year 3. The same trained group is being compared to itself in research question two just as the same untrained group is being compared to itself in research question two. Further analysis was conducted to find the differences of the mean scores from LT year 1 to LT year 3. There will be three sets of independent sample T-tests for research question two.

The expectation is that there would be a large gap in the beginning of the training. As practices are socialized and the behaviors learned as part of the training becomes engrained in the teacher's' daily work over time, regardless of type of training, there should be very little variance in teacher perceptions and attitudes at the conclusion of the training.

Teacher Group-Year of Implementation

- Independent sample T-test CT- Y1 v CT- Y3
- Independent sample T-test LT- Y1 v LT- Y3
- Independent sample T-test CT Growth Mean Difference v LT Growth Mean Difference

Research Question Three: Are there notable perception differences on the level of PLC implementation as measured by the BAT that exist year to year between the leadership team (LT) teachers that received direct instruction from the MPLC resource specialists versus the

collaborative team (CT) teacher population based upon the grade configuration of the respondent's school?

To find if one grade configuration is more responsive to training than another configuration an independent sample T-test was utilized. The LT v CT teachers were compared for year 1 in an independent sample T-test for year 1, again in year 2, and finally again for year 3 for each grade configuration. After these comparisons were made another series of independent sample T-test comparisons were conducted for each grade configuration comparing the CT year 1 to CT year 2, CT year 2 to CT year 3, and CT year 1 to CT year 3 for each grade level. This same process of independent sample T-test comparisons were made for LT year 1 to LT year 2, LT year 2 to LT year 3, and LT year 1 to LT year 3 for each grade level configuration. Two different groups are being compared in research question three for the 27 sets of independent sample T-tests.

Grade configurations may have a difference because of the development of expectations due to how the teacher teams interact and share students. Elementary teachers have fewer overall students for longer periods of time whereas middle & high school teachers have more students for shorter periods of time than their elementary counterparts. Teachers are all participants in the PLC experience in one way or another if they are respondents to the BAT.

Teacher Group-Grade Configuration-Year of Implementation

- Independent sample T-test CT v LT-Elementary Y1
- Independent sample T-test CT v LT-Elementary Y2
- Independent sample T-test CT v LT-Elementary Y3
- Independent sample T-test CT v LT-Middle School Y1
- Independent sample T-test CT v LT-Middle School Y2

- Independent sample T-test CT v LT-Middle School Y3
- Independent sample T-test CT v LT-High School Y1
- Independent sample T-test CT v LT-High School Y2
- Independent sample T-test CT v LT-High School Y3
- Independent sample T-test CT year 1 to CT year 2-Elementary
- Independent sample T-test CT year 2 to CT year 3-Elementary
- Independent sample T-test CT year 1 to CT year 3-Elementary
- Independent sample T-test CT year 1 to CT year 2- Middle School
- Independent sample T-test CT year 2 to CT year 3- Middle School
- Independent sample T-test CT year 1 to CT year 3- Middle School
- Independent sample T-test CT year 1 to CT year 2- High School
- Independent sample T-test CT year 2 to CT year 3- High School
- Independent sample T-test CT year 1 to CT year 3- High School
- Independent sample T-test LT year 1 to LT year 2-Elementary
- Independent sample T-test LT year 2 to LT year 3-Elementary
- Independent sample T-test LT year 1 to LT year 3-Elementary
- Independent sample T-test LT year 1 to LT year 2- Middle School
- Independent sample T-test LT year 2 to LT year 3- Middle School
- Independent sample T-test LT year 1 to LT year 3- Middle School
- Independent sample T-test LT year 1 to LT year 2- High School
- Independent sample T-test LT year 2 to LT year 3- High School
- Independent sample T-test LT year 1 to LT year 3- High School

Research Question Four: Are teachers' perceptions on the level of PLC implementation as measured by the BAT more responsive to training towards one domain over another regarding the influences of the MPLC Project training on the domains of collaboration, teacher learning and student learning from the initial year to the final year of the PLC implementation process?

To find if one domain is more responsive to training than another domain an independent sample T-test was utilized. The LT v CT teachers are compared for year 1 in an independent sample T-test for year 1, again in year 2 and finally again for year 3 for each domain. After these comparisons were made another series of independent sample T-test comparisons were conducted for each domain comparing the CT year 1 to CT year 2, CT year 2 to CT year 3, and CT year 1 to CT year 3 for each domain. This same process of independent sample T-test comparisons were made for LT year 1 to LT year 2, LT year 2 to LT year 3, and LT year 1 to LT year 3 for each domain. Two different groups are being compared in research question four for the 15 sets of independent sample T-tests.

To find if one domain is more responsive to training than another domain from year one to year two to year three independent sample T-tests were utilized. Domains may have a difference because of the development of expectations due to socialization of the practices. Teachers are all participants in the PLC experience in one way or another if they are respondents to the BAT.

Teacher Group-Domain-Year of Implementation

- Independent sample T-test CT v LT Collaboration Y1
- Independent sample T-test CT v LT Collaboration Y2
- Independent sample T-test CT v LT Collaboration Y3
- Independent sample T-test CT v LT Teacher Learning Y1

- Independent sample T-test CT v LT Teacher Learning Y2
- Independent sample T-test CT v LT Teacher Learning Y3
- Independent sample T-test CT v LT Student Learning Y1
- Independent sample T-test CT v LT Student Learning Y2
- Independent sample T-test CT v LT Student Learning Y3
- Independent sample T-test CT year 1 to CT year 3- Collaboration
- Independent sample T-test CT year 1 to CT year 3- Teacher Learning
- Independent sample T-test CT year 1 to CT year 3- Student Learning
- Independent sample T-test LT year 1 to LT year 3- Collaboration
- Independent sample T-test LT year 1 to LT year 3- Teacher Learning
- Independent sample T-test LT year 1 to LT year 3- Student Learning

Summary

The conceptual framework of this study is established in the importance of fostering participation and working collaboratively in a climate of mutual respect found in the principles of adult learning theory (Moore, 1988). The appreciation of teacher PD is aimed at the journey of a purposive sampling of teachers working within a MPLC Project initiative focused on the development of teachers' skills in three domains: collaborative teacher teams, student learning and teacher learning present within PLC constructs. The perception of educators is demonstrated by their commitment to the individual practices they self-evaluate on the BAT. This PD model with consistent methods and materials provided throughout the state created the ideal opportunity to assess PLC effectiveness as perceived by teachers on a large-scale statewide stage. Furthermore, the BAT survey instrument provided the data to anonymously collect both pre, mid

and post implementation data to study the effects on teachers' behaviors and attitudes of the PD model of PLC implementation.

This chapter was developed to describe the methods and procedures followed by the MPLC Project and the nine regional RPDC centers to describe the insight into the perceptions of educators during the four year MPLC Project training. The problem, research questions and design, as well as the methodology were presented to give the reader insight into the research process. In addition to describing the research process, the next chapter, chapter four, will address the seven research questions as well as a summary of the findings, including conclusions. Chapter Five will discuss implications for practice and recommendations for future research to aid stakeholders in assessing PLC training opportunities for school improvement.

CHAPTER FOUR

Findings

Introduction

The purpose of this study was to examine the influence of PLC training as it is integrated into the K-12 educational setting as demonstrated by the analysis of the teacher's attitude utilizing the BAT as the collection instrument. Teachers' self-reported perceptions regarding implementation of the program and the three domains of the MPLC Project training from year one of implementation through year three of the program were examined. The BAT's intent was to measure the attitudes and behaviors of teachers in different stages of the MPLC Project PD program. Within the BAT there are three specific domains assessed: collaboration, teacher learning, and student learning. The teacher participants in this study were all participants in the MPLC Project sponsored by the Missouri DESE which was led by the Missouri RPDC offices located in nine geographic regions throughout the state. As mentioned in Chapter One, PLC design allows for ongoing teacher development, following Marzano's (2009) research, which indicated that effective teachers have more impact on student learning than any other factor under the control of school systems. It also relates to Fullan's (2005) argument that organizations do not change, people do. PLCs work within the context of changing the manner in which educators operate, striving to change the outcome of students' overall success.

Analysis and Presentation of the Data

This study was conducted analyzing multiple years of performance employing quantitative methods. A Likert-type scale survey instrument, the BAT, was used during the implementation of the MPLC Project PD program to collect teacher perceptions annually relative to the three domains of collaboration, teacher learning, and student learning. In order to

understand the mean score values it is important to note that a lower mean is indicative of higher levels of agreement based on the assigned values. The mean for each question was calculated by assigning the value of 1 to all yes or A responses, the value of 2 to all partial or B responses, and the value of 3 to all No or C responses.

This chapter begins with an analysis of the quantitative data collected from the 6,650 completed BAT surveys. The data analysis will include the results of the educators' responses to each of the following four research questions examined. The end of chapter four will present a summary of the data findings as they relate to the research questions.

Research Question One: Are there perception differences on the level of PLC implementation as measured by the BAT between the leadership team (LT) teachers that received direct instruction from the MPLC resource specialists and the collaborative team (CT) teacher population from year to year of the MPLC Project training?

Research Question Two: Are there perception differences on the level of PLC implementation as measured by the BAT for the leadership team (LT) teachers that received direct instruction from the MPLC resource specialists and the collaborative team (CT) teacher population from the beginning of the MPLC Project training to the end of the MPLC Project training?

Research Question Three: Are there notable perception differences on the level of PLC implementation as measured by the BAT that exist year to year between the leadership team (LT) teachers that received direct instruction from the MPLC resource specialists versus the collaborative team (CT) teacher population based upon the grade configuration of the respondent's school?

Research Question Four: Are teachers' perceptions on the level of PLC implementation as measured by the BAT more responsive to training towards one domain over another regarding the influences of the MPLC Project training on the domains of collaboration, teacher learning and student learning from the initial year to the final year of the PLC implementation process?

Descriptive Statistics

Table 3 displays data comparing the year to year descriptive statistics to compare the perceptions of implementation of the CT teachers and the LT teachers. A remarkable statistic to note is the positive movement of both groups of teachers towards one which indicated that the perceptions of implementation of both groups of teachers receiving different types of training have expressed a favorable response. Also of interest is the constriction of the standard deviation which showed less variability in responses. The LT teachers have the lowest mean scores over the three-year period as well as the most constricted standard deviation when compared to the CT teachers. Also, interesting to note, despite the differences in training, the similarity of the \bar{x} scores for the LT and the CT teachers, especially in years one and three of implementation. Given the direct nature of the LT teachers' training, it was appropriate to assume that training would have a greater impact than the less direct CT teachers' training.

Table 3 Comparison of CT Teachers to LT Teachers Year 1, Year 2, and Year 3

	\bar{x}	<i>S</i>	N
CT Year 1	1.369	0.347	1604
CT Year 2	1.334	0.334	1848
CT Year 3	1.283	0.302	1706
LT Year 1	1.389	0.324	443
LT Year 2	1.300	0.286	544
LT Year 3	1.280	0.285	505

Table 4 displays descriptive statistics that compared the perceptions of implementation of the elementary CT teachers and the elementary LT teachers. This data set provided unexpected

results as the CT teachers' mean score showed more agreement in the teachers' perceptions of implementation than the LT teachers which received the MPLC Project training. These teachers have the lowest mean scores over the three-year period, however, the LT teachers have the most constricted standard deviation when compared to the CT teachers.

Table 4 Comparison of Elementary CT Teachers to LT Teachers Year 1, Year 2, and Year 3

	\bar{x}	S	N
Elem CT Year 1	1.320	0.319	975
Elem CT Year 2	1.260	0.285	871
Elem CT Year 3	1.196	0.251	669
Elem LT Year 1	1.373	0.325	277
Elem LT Year 2	1.256	0.252	275
Elem LT Year 3	1.204	0.242	228

Table 5 illustrates a noteworthy set of data comparing the year to year descriptive statistics to compare the perceptions of implementation of the middle school CT teachers and the LT teachers. The middle school LT teachers were remarkably more in agreement and less varied in their responses than the middle school CT teachers over the three-year period. Both groups of teachers made favorable progress in their perceptions of implementation over the three-year period based upon the lowering mean scores and tightening standard deviations each year.

Table 5 Comparison of Middle School CT Teachers to LT Teachers Year 1, Year 2, and Year 3

	\bar{x}	S	N
MS CT Year 1	1.427	0.367	268
MS CT Year 2	1.405	0.356	437
MS CT Year 3	1.348	0.304	415
MS LT Year 1	1.365	0.320	82
MS LT Year 2	1.326	0.309	135
MS LT Year 3	1.237	0.237	120

Table 6 shows unexpected results as the high school CT teachers' mean score showed more agreement in the teachers' perceptions of implementation than the high school LT teachers

which received the MPLC Project training. The CT teachers have the lowest mean scores over the three-year period, however, the LT teachers have the most constricted standard deviation when compared to the CT teachers. Looking at these \bar{x} scores in tables 4, 5, and 6, it is clear that elementary teachers had consistently lower \bar{x} scores of the three levels of teachers.

Table 6 Comparison of High School CT Teachers to LT Teachers Year 1, Year 2, and Year 3

	\bar{x}	<i>S</i>	N
HS CT Year 1	1.459	0.379	361
HS CT Year 2	1.395	0.363	540
HS CT Year 3	1.334	0.329	622
HS LT Year 1	1.475	0.316	84
HS LT Year 2	1.365	0.314	134
HS LT Year 3	1.424	0.321	157

Table 7 displays a comparison of the CT teachers to the LT teachers' descriptive statistics regarding teachers' perceptions of implementation in the collaborative domain. The mean scores of both the CT teachers and the LT teachers decreased along with the variability in the standard deviation indicating that both groups of teachers moved towards agreement in perceptions of implementation based upon the collaborative domain. Although both groups responded favorably to the training, the LT teachers' mean score and standard deviation were both lower than the CT teachers in the collaborative domain.

Table 7 Comparison of CT Teachers to LT Teachers Collaborative Domain Year 1, Year 2 and Year 3

	\bar{x}	<i>S</i>	N
CT Year 1 Collaboration	1.282	0.312	1604
CT Year 2 Collaboration	1.264	0.306	1848
CT Year 3 Collaboration	1.225	0.269	1706
LT Year 1 Collaboration	1.252	0.277	443
LT Year 2 Collaboration	1.205	0.247	544
LT Year 3 Collaboration	1.186	0.234	505

Table 8 illustrates a comparison of the CT teachers to the LT teachers' descriptive statistics regarding teachers' perception scores in the teacher learning domain. The mean scores of both the CT teachers and the LT teachers decreased along with the variability in the standard deviation indicating that both groups of teachers moved towards agreement in their perceptions of implementation in the teacher learning domain. Although both groups responded favorably to the training, the LT teachers' mean score and standard deviation were both lower than the CT teachers in the teacher learning domain.

Table 8 Comparison of CT Teachers to LT Teachers Teacher Learning Domain Year 1, Year 2 and Year 3

	\bar{x}	<i>S</i>	N
CT Year 1 Teacher Learning	1.416	0.537	1604
CT Year 2 Teacher Learning	1.368	0.508	1848
CT Year 3 Teacher Learning	1.323	0.467	1706
LT Year 1 Teacher Learning	1.480	0.528	443
LT Year 2 Teacher Learning	1.390	0.494	544
LT Year 3 Teacher Learning	1.350	0.478	505

Table 9 shows a comparison of the CT teachers to the LT teachers descriptive statistics regarding teachers' perception scores in the student learning domain. This data set provided unexpected results as the CT teachers' mean score showed more agreement in the teachers'

Table 9 Comparison of CT Teachers to LT Teachers Student Learning Domain Year 1, Year 2 and Year 3

	\bar{x}	<i>S</i>	N
CT Year 1 Student Learning	1.456	0.462	1604
CT Year 2 Student Learning	1.368	0.428	1848
CT Year 3 Student Learning	1.337	0.399	1706
LT Year 1 Student Learning	1.520	0.463	443
LT Year 2 Student Learning	1.382	0.397	544
LT Year 3 Student Learning	1.366	0.405	505

perceptions of implementation than the LT teachers which received the MPLC Project training. The CT teachers have both the lowest mean scores and the most constricted standard deviation over the three-year period in the student learning domain when compared to the LT teachers.

Research Question One

The first research question examined cohort teacher perceptions of implementation by year of implementation of the MPLC Project training program. There are two cohorts of teachers in research question one, which are the CT teachers and the LT teachers. The perceptions of CT teachers were compared to the perceptions of the LT teachers based upon year of participation in the program utilizing the BAT survey instrument to gather perceptions. The BAT instrument's purpose was to gather the perception differences of teachers based upon group affiliation of either the leadership team (LT) teachers, which received direct instruction from the MPLC resource specialists, and the collaborative team (CT) teacher population, who did not receive direct instruction from the MPLC resource specialists. Aggregate responses were evaluated by both group affiliation, either LT or CT, and year of participation in the training program. Respondents answered questions specific to the MPLC PD regarding the three domains of the MPLC Project training: collaboration, teacher learning and student learning. Respondents answered each of the 15 questions on a Likert-type scale using a 3-point scale: A-Yes, B-Partially, or C-No. Research question one is composed of three calculations which were analyzed to determine if there was in fact a perceptual difference between members of the CT compared to members of the LT during each year of implementation of the MPLC training.

The first calculation for research question one was the comparison of CT Teachers to LT teachers during year one. Table 10 displays that the mean score for the year one CT teachers (N

= 1604, $\bar{x} = 1.369$) was not a statistically significant difference compared to the year one LT teachers (N = 443, $\bar{x} = 1.389$). The second calculation for research question one was performed to compare the CT teachers to the LT teachers during year two of the MPLC training. The mean score for the year two CT teachers (N = 1848, $\bar{x} = 1.334$) was statistically significant compared to the year two LT teachers (N = 544, $\bar{x} = 1.300$). The last calculation was performed to compare the mean scores for the CT teachers to the LT teachers during year three of the MPLC training. The mean score for the year three CT teachers (N = 1706, $\bar{x} = 1.283$) is not statistically significant when compared to the year three LT teachers (N = 505, $\bar{x} = 1.280$).

Table 10 Comparison of CT Teachers to LT Teachers Year 1, Year 2, and Year 3

	\bar{x}	S	N	t-value	p-value	Selected α Level	Critical t-value for Selected α Level	# t-tests Conducted	Bonferroni Adjusted α	Adjusted Critical t-value	Statistically Significant
CT Year 1	1.369	0.347	1604	-1.075	0.283	0.05	1.960	2	$0.05/2 = 0.025$	2.327	No
LT Year 1	1.389	0.324	443								
CT Year 2	1.334	0.334	1848	2.135	0.033	0.05	1.960	1	$0.05/1 = 0.05$	1.960	Yes
LT Year 2	1.300	0.286	544								
CT Year 3	1.283	0.302	1706	0.193	0.985	0.05	1.960	2	$0.05/2 = 0.025$	2.327	No
LT Year 3	1.280	0.285	505								

Research Question Two

Research question two evaluated the differences on the level of PLC implementation as measured by the BAT for the CT teachers and the LT teachers sample from the beginning of the MPLC Project to the end of the MPLC Project. The first set of data analyzed for research question two compared the CT teachers' attitudes from year one to year three. As shown in table 11, the mean score for the year one CT teachers (N = 1604, $\bar{x} = 1.369$) was statistically significant when compared to the scores for the year three CT teachers (N = 1706, $\bar{x} = 1.283$). The second analysis for research question two conveyed the mean score for the year one LT

Table 11 Comparison of CT Teachers Year 1 to Year 3 and Comparison of LT Teachers Year 1 to Year 3

	\bar{x}	S	N	t-value	p-value	Selected α Level	Critical t-value for Selected α Level	# t-tests Conducted	Bonferroni Adjusted α	Adjusted Critical t-value	Statistically Significant
CT Year 1	1.369	0.347	1604	7.654	0.0001	0.05	1.960	2	0.05/2=0.025	2.327	Yes
CT Year 3	1.283	0.302	1706								
LT Year 1	1.389	0.324	443	5.517	0.0001	0.05	1.960	2	0.05/2=0.025	2.327	Yes
LT Year 3	1.280	0.285	505								

teachers (N = 443, \bar{x} = 1.389) was statistically significant compared to the year three LT teachers (N = 505, \bar{x} = 1.280). The mean values for research question two were statistically significant.

Research Question Three

Research question three was concerned with the notable perception differences on the level of PLC implementation as measured by the BAT that exists year to year between the leadership team (LT) teachers that received direct instruction from the MPLC resource specialists compared to the collaborative team (CT) teacher population based upon the grade configuration of the respondent's school. There were three grade configurations in this study sample which were elementary, middle school, and high school. Research question three studied 27 analyses to evaluate if one grade configuration was more responsive to training than another when evaluating teacher perceptions of implementation within the training year and the teachers' grade configurations. The LT v CT teachers are compared for year 1 in an independent sample T-test, again in year 2, and finally again for year 3 for each grade configuration. After these comparisons were made another series of independent sample T-test comparisons were conducted for each grade configuration comparing the CT year 1 to CT year 2, CT year 2 to CT year 3, and CT year 1 to CT year 3 for each grade level. This same process of independent sample T-test comparisons were made for LT year 1 to LT year 2, LT year 2 to LT year 3, and

LT year 1 to LT year 3 for each grade level configuration. Two different groups are being compared in research question three for the 27 sets of independent sample T-tests.

As seen in table 12, the first analyses for research question three revealed there was not a statistically significant difference when comparing the year one elementary CT teachers ($N = 975$, $\bar{x} = 1.320$) to the year one elementary LT teachers ($N = 277$, $\bar{x} = 1.373$). In fact, there was not a statistically significant link when comparing the year two elementary CT teachers ($N = 871$, $\bar{x} = 1.260$) to the year two elementary LT teachers ($N = 275$, $\bar{x} = 1.256$) or between the year three elementary CT teachers ($N = 669$, $\bar{x} = 1.196$) as compared to the year three elementary LT teachers ($N = 228$, $\bar{x} = 1.204$). Both the year one and year three elementary LT teachers had a larger mean score than the corresponding year one and year three elementary CT teachers. What this means is that the elementary CT teachers showed greater responsiveness to training than the elementary LT teachers that received direct training.

Table 12 Comparison of Elementary CT Teachers to LT Teachers Year 1, Year 2, and Year 3

	\bar{x}	S	N	t-value	p-value	Selected α Level	Critical t-value for Selected α Level	# t-tests Conducted	Bonferroni Adjusted α	Adjusted Critical t-value	Statistically Significant
Elem CT Year 1	1.320	0.319	975	-2.400	0.017	0.05	1.960	3	$0.05/3 = 0.0167$	2.452	No
Elem LT Year 1	1.373	0.325	277								
Elem CT Year 2	1.260	0.285	871	0.237	0.813	0.05	1.960	3	$0.05/3 = 0.0167$	2.452	No
Elem LT Year 2	1.256	0.252	275								
Elem CT Year 3	1.196	0.251	669	-0.424	0.672	0.05	1.960	3	$0.05/3 = 0.0167$	2.452	No
Elem LT Year 3	1.204	0.242	228								

As displayed in table 13, there was not a statistically significant difference in the mean scores comparing the perceptions of implementation of the year one middle school (MS) CT teachers ($N = 268$, $\bar{x} = 1.427$) to the perceptions of the year one MS LT teachers ($N = 82$, $\bar{x} = 1.365$). By the same token, there was not a statistically significant difference in the year two MS

CT teachers' ($N = 437$, $\bar{x} = 1.405$) perceptions compared to the year two MS LT teachers' ($N = 135$, $\bar{x} = 1.326$) perceptions when participating in the MPLC Project training. On the contrary, there was a statistically significant difference between year three MS CT teachers ($N = 415$, $\bar{x} = 1.348$) perceptions compared to the year three MS LT teachers' ($N = 120$, $\bar{x} = 1.237$) perceptions.

Table 13 Comparison of Middle School CT Teachers to LT Teachers Year 1, Year 2, and Year 3

	\bar{x}	S	N	t-value	p-value	Selected α Level	Critical t-value for Selected α Level	# t-tests Conducted	Bonferroni Adjusted α	Adjusted Critical t-value	Statistically Significant
MS CT Year 1	1.427	0.367	268	1.583	0.114	0.05	1.990	3	0.05/3=0.0167	2.507	No
MS LT Year 1	1.365	0.320	82								
MS CT Year 2	1.405	0.356	437	2.315	0.021	0.05	1.984	3	0.05/3=0.0167	2.496	No
MS LT Year 2	1.326	0.309	135								
MS CT Year 3	1.348	0.304	415	3.688	0.0003	0.05	1.984	3	0.05/3=0.0167	2.496	Yes
MS LT Year 3	1.237	0.237	120								

As shown in Table 14, the analyses of high school (HS) teachers for research question three indicated that there was not a statistically significant difference in the comparison of the HS CT teachers ($N = 361$, $\bar{x} = 1.459$) to the HS LT teachers' ($N = 84$, $\bar{x} = 1.475$) attitudes in the

Table 14 Comparison of High School CT Teachers to LT Teachers Year 1, Year 2, and Year 3

	\bar{x}	S	N	t-value	p-value	Selected α Level	Critical t-value for Selected α Level	# t-tests Conducted	Bonferroni Adjusted α	Adjusted Critical t-value	Statistically Significant
HS CT Year 1	1.459	0.379	361	-0.374	0.709	0.05	1.990	3	0.05/3=0.0167	2.507	No
HS LT Year 1	1.475	0.316	84								
HS CT Year 2	1.395	0.363	540	0.875	0.382	0.05	1.984	3	0.05/3=0.0167	2.496	No
HS LT Year 2	1.365	0.314	134								
HS CT Year 3	1.334	0.329	622	-3.083	0.002	0.05	1.984	3	0.05/3=0.0167	2.496	Yes
HS LT Year 3	1.424	0.321	157								

first year of MPLC Project training program. Likewise, there was not a statistically significant difference in the year two HS CT teachers ($N = 540, \bar{x} = 1.395$) as compared to the year two HS LT teachers ($N = 134, \bar{x} = 1.365$). Conversely, among third year HS teacher participants, there was a statistically significant difference between the two teaching groups, HS CT teachers ($N = 622, \bar{x} = 1.334$) and HS LT teachers ($N = 157, \bar{x} = 1.424$).

As referenced in table 15, the comparison of the year one elementary CT teachers' ($N = 975, \bar{x} = 1.320$) attitudes to the year two elementary CT teachers' ($N = 871, \bar{x} = 1.260$) attitudes revealed the existence of a statistically significant difference in teachers' attitudes during the MPLC training. Similarly, the year two CT teachers ($N = 871, \bar{x} = 1.260$) perceptions of implementation compared to the year three CT teachers' ($N = 669, \bar{x} = 1.196$) perceptions was shown to be a statistically significant relationship during the MPLC Project training as displayed in table 15. In the same way, there is a statistically significant difference noted between the year one elementary CT teachers ($N = 975, \bar{x} = 1.320$) and the year three elementary CT teachers' ($N = 669, \bar{x} = 1.196$) attitudes.

Table 15 Comparison of Elementary CT Teachers Year 1 to CT Teachers Year 3

	\bar{x}	S	N	t-value	p-value	Selected α Level	Critical t-value for Selected α Level	# t-tests Conducted	Bonferroni Adjusted α	Adjusted Critical t-value	Statistically Significant
Elem CT Year 1	1.320	0.319	975	4.244	0.00002	0.05	1.960	3	$0.05/3 = 0.0167$	2.452	Yes
Elem CT Year 2	1.260	0.285	871								
Elem CT Year 2	1.260	0.285	871	4.643	0.00001	0.05	1.960	3	$0.05/3 = 0.0167$	2.452	Yes
Elem CT Year 3	1.196	0.251	669								
Elem CT Year 1	1.320	0.319	975	8.466	0.00001	0.05	1.960	3	$0.05/3 = 0.0167$	2.452	Yes
Elem CT Year 3	1.196	0.251	669								

As table 16 suggests, there was not a statistically significant difference in the population sample's mean scores comparing the perceptions of implementation of the year one MS CT

teachers ($N = 268$, $\bar{x} = 1.427$) to the year two MS CT teachers ($N = 437$, $\bar{x} = 1.405$). However, there was a statistically significant difference in the mean scores when comparing the perceptions of the year two MS CT teachers ($N = 437$, $\bar{x} = 1.405$) to the year three MS CT teachers ($N = 415$, $\bar{x} = 1.348$) as well as between the year one MS CT teachers ($N = 268$, $\bar{x} = 1.427$) perceptions compared to the year three MS CT teachers' ($N = 415$, $\bar{x} = 1.348$) perceptions during the MPLC Project training.

Table 16 Comparison of Middle School CT Teachers Year 1 to CT Teachers Year 3

	\bar{x}	S	N	t-value	p-value	Selected α Level	Critical t-value for Selected α Level	# t-tests Conducted	Bonferroni Adjusted α	Adjusted Critical t-value	Statistically Significant
MS CT Year 1	1.427	0.367	268	0.810	0.418	0.05	1.960	3	0.05/3=0.0167	2.452	No
MS CT Year 2	1.405	0.356	437								
MS CT Year 2	1.405	0.356	437	2.511	0.012	0.05	1.960	3	0.05/3=0.0167	2.452	Yes
MS CT Year 3	1.348	0.304	415								
MS CT Year 1	1.427	0.367	268	3.083	0.002	0.05	1.960	3	0.05/3=0.0167	2.452	Yes
MS CT Year 3	1.348	0.304	415								

Table 17 represents the comparison of the year one HS CT teachers' ($N = 361$, $\bar{x} = 1.459$) attitudes to the year two HS CT teachers' ($N = 540$, $\bar{x} = 1.395$) attitudes which revealed that there was a statistically significant difference in teachers' attitudes during the MPLC training.

Table 17 Comparison of High School CT Teachers Year 1 to CT Teachers Year 3

	\bar{x}	S	N	t-value	p-value	Selected α Level	Critical t-value for Selected α Level	# t-tests Conducted	Bonferroni Adjusted α	Adjusted Critical t-value	Statistically Significant
HS CT Year 1	1.459	0.379	361	2.534	0.012	0.05	1.960	3	0.05/3=0.0167	2.452	Yes
HS CT Year 2	1.395	0.363	540								
HS CT Year 2	1.395	0.363	540	3.028	0.003	0.05	1.960	3	0.05/3=0.0167	2.452	Yes
HS CT Year 3	1.334	0.329	622								
HS CT Year 1	1.459	0.379	361	5.429	0.0001	0.05	1.960	3	0.05/3=0.0167	2.452	Yes
HS CT Year 3	1.334	0.329	622								

Likewise, there was a statistically significant difference between the year two CT teachers ($N = 540, \bar{x} = 1.395$) attitudes compared to the mean of the year three CT teachers' ($N = 622, \bar{x} = 1.334$) perceptions of implementation as displayed in table 10. In the same way, there was a statistically significant difference noted between the year one HS CT teachers ($N = 361, \bar{x} = 1.459$) and the year three HS CT teachers' ($N = 622, \bar{x} = 1.334$).

Table 18 denotes the comparison of the year one elementary LT teachers' ($N = 277, \bar{x} = 1.373$) attitudes to the year two elementary LT teachers' ($N = 275, \bar{x} = 1.256$) attitudes which revealed the existence of a statistically significant difference in teachers' attitudes during the MPLC training. Unlike the comparison of the initial and concluding years of this study, the year two LT teachers ($N = 275, \bar{x} = 1.256$) perceptions of implementation compared to the year three LT teachers' ($N = 228, \bar{x} = 1.204$) perceptions did not show a statistically significant relationship during the MPLC Project training as displayed in table 11. However, like the year one to year two elementary LT teachers' comparisons, there was a statistically significant difference noted between the year one elementary LT teachers ($N = 277, \bar{x} = 1.373$) and the year three elementary LT teachers' ($N = 228, \bar{x} = 1.204$) attitudes.

Table 18 Comparison of Elementary LT Teachers Year 1 to LT Teachers Year 3

	\bar{x}	S	N	t-value	p-value	Selected α Level	Critical t-value for Selected α Level	# t-tests Conducted	Bonferroni Adjusted α	Adjusted Critical t-value	Statistically Significant
Elem LT Year 1	1.373	0.325	277	4.730	0.0001	0.05	1.960	3	$0.05/3 = 0.0167$	2.452	Yes
Elem LT-Year 2	1.256	0.252	275								
Elem LT Year 2	1.256	0.252	275	2.343	0.020	0.05	1.960	3	$0.05/3 = 0.0167$	2.452	No
Elem LT Year 3	1.204	0.242	228								
Elem LT Year 1	1.373	0.325	277	6.508	0.0001	0.05	1.960	3	$0.05/3 = 0.0167$	2.452	Yes
Elem LT Year 3	1.204	0.242	228								

As indicated in table 19, there was not a statistically significant difference in the mean scores comparing the perceptions of implementation of the year one MS LT teachers ($N = 82$, $\bar{x} = 1.356$) to the perceptions of the year two MS LT teachers ($N = 135$, $\bar{x} = 1.326$). Conversely,

Table 19 Comparison of Middle School LT Teachers Year 1 to LT Teachers Year 3

	\bar{x}	S	N	t-value	p-value	Selected α Level	Critical t-value for Selected α Level	# t-tests Conducted	Bonferroni Adjusted α	Adjusted Critical t-value	Statistically Significant
MS LT Year 1	1.356	0.320	82	0.687	0.493	0.05	1.990	3	$0.05/3=0.0167$	2.507	No
MS LT Year 2	1.326	0.309	135								
MS LT Year 2	1.326	0.309	135	2.562	0.011	0.05	1.984	3	$0.05/3=0.0167$	2.496	Yes
MS LT Year 3	1.237	0.237	120								
MS LT Year 1	1.365	0.320	82	3.044	0.003	0.05	1.990	3	$0.05/3=0.0167$	2.507	Yes
MS LT Year 3	1.237	0.237	120								

however, there was a statistically significant difference in the year two MS LT teachers' ($N = 135$, $\bar{x} = 1.326$) perceptions compared to the year three MS LT teachers' ($N = 120$, $\bar{x} = 1.237$) perceptions when participating in the MPLC Project training. In the same manner, there was a statistically significant difference between year one MS LT teachers' ($N = 82$, $\bar{x} = 1.356$) perceptions compared to the year three MS LT teachers' ($N = 120$, $\bar{x} = 1.237$) perceptions during the MPLC Project training as represented in table 19.

As visualized in Table 20, the analyses for the comparison of year one HS LT teachers ($N = 84$, $\bar{x} = 1.475$) compared to the year two HS LT teachers ($N = 134$, $\bar{x} = 1.365$) revealed there was a statistically significant difference in the two groups of teachers. In spite of this, there was not a statistically significant difference in teacher perceptions between the year two HS LT teachers ($N = 134$, $\bar{x} = 1.365$) and the year three HS LT teachers ($N = 157$, $\bar{x} = 1.424$). In the same way, there is not a statistically significant difference between the mean of the year one HS

LT teachers ($N = 84$, $\bar{x} = 1.475$) and the year three HS LT teachers ($N = 157$, $\bar{x} = 1.424$) as shown in table 20.

Table 20 Comparison of High School LT Teachers Year 1 to LT Teachers Year 3

	\bar{x}	S	N	t-value	p-value	Selected α Level	Critical t-value for Selected α Level	# t-tests Conducted	Bonferroni Adjusted α	Adjusted Critical t-value	Statistically Significant
HS LT Year 1	1.475	0.316	84	2.513	0.013	0.05	1.990	3	$0.05/3=0.0167$	2.507	Yes
HS LT Year 2	1.365	0.314	134								
HS LT Year 2	1.365	0.314	134	-1.567	0.118	0.05	1.984	3	$0.05/3=0.0167$	2.496	No
HS LT Year 3	1.424	0.321	157								
HS LT Year 1	1.475	0.316	84	1.195	0.233	0.05	1.990	3	$0.05/3=0.0167$	2.507	No
HS LT Year 3	1.424	0.321	157								

Research Question Four

Research question four evaluated the differences in teacher perceptions of implementation based upon one of the three domains of teacher development towards the PLC principles during the MPLC Project training as measured by the BAT. Both the CT and the LT teacher populations were compared by year of training within each of the three domains. Research question four analyzed the CT teachers' perceptions of implementation compared to those of the LT teachers by comparing the mean scores of the teacher groups during various years of the MPLC Project training to determine if there were statistically significant perception findings by PLC domain. In a similar fashion to the data analysis of the CT teachers, the LT teachers' perceptions were also evaluated.

Research question four differed from the first three research questions due to the examination of the three domains. Only the questions that corresponded to the applicable domain were evaluated for each sub-question in research question four. When considering the

collaboration domain, there were a total of seven of the 15 questions scrutinized. Likewise, there were two of the 15 questions that were aligned to the teacher learning domain that were investigated. Finally, the student learning domain analyzed six of the 15 questions that were aligned concordantly.

As shown in table 21, the first data comparison for research question four was not statistically significant when comparing the year one CT teachers' ($N = 1604$, $\bar{x} = 1.282$) attitudes to the year one LT teachers' ($N = 443$, $\bar{x} = 1.252$) attitudes in the collaborative domain during MPLC Project training. On the contrary, the mean for the collaborative domain for the year two CT teachers ($N = 1848$, $\bar{x} = 1.264$) compared to the mean for the year two LT teachers ($N = 544$, $\bar{x} = 1.205$) indicated there was a statistically significant difference in the collaborative domain. In the same way, there was a statistically significant difference between the mean of the year three CT teachers ($N = 1706$, $\bar{x} = 1.225$) and the year three LT teachers ($N = 505$, $\bar{x} = 1.186$) in the collaborative domain.

Table 21 Comparison of CT Teachers to LT Teachers Collaborative Domain Year 1, Year 2 and Year 3

	\bar{x}	S	N	t-value	p-value	Selected α Level	Critical t-value for Selected α Level	# t-tests Conducted	Bonferroni Adjusted α	Adjusted Critical t-value	Statistically Significant
CT Year 1 Collaboration	1.282	0.312	1604	1.866	0.062	0.05	1.960	2	$0.05/2 = 0.025$	2.327	No
LT Year 1 Collaboration	1.252	0.277	443								
CT Year 2 Collaboration	1.264	0.306	1848	4.170	0.00003	0.05	1.960	1	$0.05/1 = 0.05$	1.960	Yes
LT Year 2 Collaboration	1.205	0.247	544								
CT Year 3 Collaboration	1.225	0.269	1706	2.898	0.004	0.05	1.960	2	$0.05/2 = 0.025$	2.327	Yes
LT Year 3 Collaboration	1.186	0.234	505								

Table 22 revealed the analyses for the teacher learning domain as the CT teachers were compared to the LT teachers' perceptions. The analyses for the comparison of year one CT teachers' ($N = 1604$, $\bar{x} = 1.416$) perceptions of implementation compared to the year one LT

teachers' ($N = 443$, $\bar{x} = 1.480$) perceptions revealed there was not a statistically significant difference in the two groups of teachers in the teacher learning domain. By the same token, among the year two teacher groups, there was not a statistically significant difference in teacher perceptions in the teacher learning domain between the year two CT teachers ($N = 1848$, $\bar{x} = 1.368$) and the year two LT teachers' ($N = 544$, $\bar{x} = 1.390$) perceptions. In the same way, there was not a statistically significant difference in the teacher learning domain between the mean of the year three CT teachers ($N = 1706$, $\bar{x} = 1.323$) and the year three LT teachers ($N = 505$, $\bar{x} = 1.350$). It should be noted in table 15 that for each of the three analyses for the teacher learning domain the LT teachers showed a larger mean score than the CT teachers for year one, year two, and year three.

Table 22 Comparison of CT Teachers to LT Teachers Teacher Learning Domain Year 1, Year 2 and Year 3

	\bar{x}	S	N	t-value	p-value	Selected α Level	Critical t-value for Selected α Level	# t-tests Conducted	Bonferroni Adjusted α	Adjusted Critical t-value	Statistically Significant
CT Year 1 Teacher Learning	1.416	0.537	1604	-2.214	0.027	0.05	1.960	2	$0.05/2 = 0.025$	2.327	No
LT Year 1 Teacher Learning	1.480	0.528	443								
CT Year 2 Teacher Learning	1.368	0.508	1848	-0.894	0.371	0.05	1.960	1	$0.05/1 = 0.05$	1.960	No
LT Year 2 Teacher Learning	1.390	0.494	544								
CT Year 3 Teacher Learning	1.323	0.467	1706	-1.145	0.252	0.05	1.960	2	$0.05/2 = 0.025$	2.327	No
LT Year 3 Teacher Learning	1.350	0.478	505								

In table 23, the analyses for the student learning domain compared the year one CT teachers ($N = 1604$, $\bar{x} = 1.456$) to the year one LT teachers ($N = 443$, $\bar{x} = 1.520$) which revealed a statistically significant difference in the two groups of teachers. However, among the year two teacher groups, there was not a statistically significant difference in teacher perceptions in the

student learning domain between the year two CT teachers ($N = 1848$, $\bar{x} = 1.368$) and the year two LT teachers ($N = 544$, $\bar{x} = 1.382$). In the same way, there was not a statistically significant difference in the student learning domain between the mean of the year three CT teachers ($N = 1706$, $\bar{x} = 1.337$) and the year three LT teachers ($N = 505$, $\bar{x} = 1.366$). For each of the three analyses for the student learning domain the LT teachers had a larger mean score than the CT teachers for years one, two, and three.

Table 23 Comparison of CT Teachers to LT Teachers Student Learning Domain Year 1, Year 2 and Year 3

	\bar{x}	S	N	t-value	p-value	Selected α Level	Critical t-value for Selected α Level	# t-tests Conducted	Bonferroni Adjusted α	Adjusted Critical t-value	Statistically Significant
CT Year 1 Student Learning	1.456	0.462	1604	-2.573	0.010	0.05	1.960	2	$0.05/2 = 0.025$	2.327	Yes
LT Year 1 Student Learning	1.520	0.463	443								
CT Year 2 Student Learning	1.368	0.428	1848	-0.594	0.553	0.05	1.960	1	$0.05/1 = 0.05$	1.960	No
LT Year 2 Student Learning	1.382	0.397	544								
CT Year 3 Student Learning	1.337	0.399	1706	-1.403	0.161	0.05	1.960	2	$0.05/2 = 0.025$	2.327	No
LT Year 3 Student Learning	1.366	0.405	505								

As noted in table 24, there is a statistically significant difference in teachers' perceptions between years one and three of the MPLC training in the collaborative domain when comparing the year one CT teachers' ($N = 1604$, $\bar{x} = 1.282$) perceptions to the year three CT teachers' ($N = 1706$, $\bar{x} = 1.225$) perceptions. Analogously, the year one CT teachers ($N = 1604$, $\bar{x} = 1.416$) perceptions compared to the mean of the year three CT teachers' ($N = 1706$, $\bar{x} = 1.323$) perceptions revealed a statistically significant difference in the teacher learning domain. Equally, there was a statistically significant difference between year one ($N = 1604$, $\bar{x} = 1.456$) and year three CT teachers ($N = 1706$, $\bar{x} = 1.337$) in the student learning domain. All three PLC

Table 24 Comparison of CT Teachers in the Collaborative, Teacher Learning, and Student Learning Domains Year 1 to Year 3

	\bar{x}	S	N	t-value	p-value	Selected α Level	Critical t-value for Selected α Level	# t-tests Conducted	Bonferroni Adjusted α	Adjusted Critical t-value	Statistically Significant
CT Year 1 Collaboration	1.282	0.312	1604	5.659	0.0001	0.05	1.960	2	0.05/2=0.025	2.327	Yes
CT Year 3 Collaboration	1.225	0.269	1706								
CT Year 1 Teacher Learning	1.416	0.537	1604	5.322	0.0001	0.05	1.960	2	0.05/2=0.025	2.327	Yes
CT Year 3 Teacher Learning	1.323	0.467	1706								
CT Year 1 Student Learning	1.456	0.462	1604	7.915	0.0001	0.05	1.960	2	0.05/2=0.025	2.327	Yes
CT Year 3 Student Learning	1.337	0.399	1706								

The results in table 25 revealed that among the LT teachers in year one ($N = 443$, $\bar{x} = 1.252$) and year three ($N = 505$, $\bar{x} = 1.186$) in the collaborative domain, there was a statistically significant difference between the two teacher groups. The year one LT teachers' ($N = 443$, $\bar{x} = 1.480$) perceptions compared to the year three LT teachers' ($N = 505$, $\bar{x} = 1.350$) perceptions revealed a statistically significant difference as well. In the same way, the final comparison for

Table 25 Comparison of LT Teachers in the Collaborative, Teacher Learning, and Student Learning Domains Year 1 to Year 3

	\bar{x}	S	N	t-value	p-value	Selected α Level	Critical t-value for Selected α Level	# t-tests Conducted	Bonferroni Adjusted α	Adjusted Critical t-value	Statistically Significant
LT Year 1 Collaboration	1.252	0.277	443	3.919	0.0001	0.05	1.960	2	0.05/2=0.025	2.327	Yes
LT Year 3 Collaboration	1.186	0.234	505								
LT Year 1 Teacher Learning	1.480	0.528	443	3.954	0.0008	0.05	1.960	2	0.05/2=0.025	2.327	Yes
LT Year 3 Teacher Learning	1.350	0.478	505								
LT Year 1 Student Learning	1.520	0.463	443	5.459	0.00001	0.05	1.960	2	0.05/2=0.025	2.327	Yes
LT Year 3 Student Learning	1.366	0.405	505								

research question four revealed a statistically significant difference between year one LT teachers ($N = 443$, $\bar{x} = 1.520$) and year three LT teachers ($N = 505$, $\bar{x} = 1.366$) in the student learning domain.

Summary

Chapter four examined the influence the MPLC Project training as it has been integrated into the K-12 educational setting as demonstrated by the analysis of the teacher's attitude utilizing the BAT as the collection instrument. The measurement of teacher attitudes in each of the four research questions was examined through a variety of different lenses and in different stages of the MPLC Project training program.

Research question one examined the perceptions of CT teachers compared to the perceptions of the LT teachers based upon year of participation in the program utilizing the BAT survey instrument to gather perceptions. Only year two comparisons proved to be statistically significant. Comparisons of the CT teachers' perceptions to the LT teachers' perceptions were not statistically significant in years one or three of the study.

Research question two evaluated both the CT and the LT teachers' perceptions and compared the mean scores of these teacher groups for various years of the MPLC Project training to determine if there were significant perception findings. Both of the comparisons in research question two were statistically significant. The comparison of the year one CT teachers' perceptions to the year three CT teachers' perceptions and the LT teachers' perceptions in year one compared to the year three teachers' perceptions were statistically significant. In addition to the statistically significant relationships noted, the mean scores from year one to year three of the MPLC training period declined.

Research question three studied 27 analyses to evaluate the teacher perceptions of the MPLC Project training given their role as a CT or LT, year of participation in the MPLC Project training and the teachers' grade configurations. Approximately forty percent, or 11 of the 27 analyses were deemed as statistically significant. The elementary teachers changed most frequently with five of the nine analyses registered as statistically significant. The elementary teachers demonstrated growth in their teacher perceptions from year one to year three within both the CT and the LT groups but none of the three analyses comparing the CT to the LT teacher group was statistically significant. The MS teachers demonstrated statistical significance in three of the nine analyses. Each set of analyses measuring growth over time registered one of the three comparisons as statistically significant but each instance was only in year three comparisons. The HS CT teachers demonstrated the most growth. The HS CT teachers exhibited statistical significance when comparing years one to three and also when comparing years two to three. Likewise, the final display of statistical significance was in comparing the HS CT teachers to the HS LT teachers in year three of the MPLC training. There was a total of three out of nine statistically significant findings for the HS teachers' comparisons. The elementary teachers proved to be the most adapted to the MPLC Project training based on the perceptions of their teacher groups.

Finally, research question four evaluated the differences in teacher perceptions based upon one of the three domains of teacher learning during the MPLC Project training as measured by the BAT. Overall, there were nine statistically significant findings from the 15 PLC domain calculations. Similar to the findings in research question three, there is a strong degree of statistically significant connections when comparing the growth of the mindsets within the CT teachers' perceptions over time as well as within the LT teachers' perceptions over time

however, there are fewer statistically significant comparisons between the CT teachers' and the LT teachers' perceptions over time. When considering the individual PLC domains, there were four out of five statistically significant findings within the collaborative domain comparisons. The comparison of the year one CT teachers to the year one LT teachers was not a statistically significant relationship. However, as teachers progressed through the training program, there was a statistically significant relationship between the year two CT teachers compared to the year two LT teachers and also for the year three CT teachers compared to the year two LT teachers. It was also determined that there was a statistically significant relationship between the year one CT teachers compared to the year three CT teachers just as there was a statistically significant relationship between the year one LT teachers compared to the year three LT teachers.

The examination of the teacher learning domain revealed there were two out of five statistically significant findings. There was an absence of statistically significant relationships for any comparison of the CT teachers to the LT teachers in years one, two, or three. The statistically significant relationships were found to exist when comparing the year one CT teachers to the year three CT teachers and finally, when comparing the year one LT teachers to the year three LT teachers.

The student learning domain displayed three out of five statistically significant findings within the domain. The findings were not statistically significant and there was not a real difference between the CT teachers and the LT teachers for years two or year three of the MPLC Project training. Initially, there was a statistically significant difference between the CT teachers and the LT teachers during year one of the training. There were statistically significant relationships when comparing the year one CT teachers to the year three CT teachers and finally,

when comparing the year one LT teachers to the year three LT teachers for the student learning domain.

In conclusion, the findings indicated that the training positively impacted teachers over time. There were few statistically significant differences in the data related to the delivery of the training between the CT teacher groups and the LT teacher groups. What really mattered, more than the training, was the time, or the duration, in the program. The training was found to be more meaningful from beginning to end when comparing the year one CT teachers to the year three CT teachers and similarly when comparing the year one LT teachers to the year three LT teachers. The expansion of the findings from chapter four will be shared in chapter five. The chapter will begin with a summary of the research purpose and findings. In addition, the relationship between the quantitative results and the literature will be discussed. Chapter five will conclude with recommendations for further study and any implications the current study may have for PLC reform efforts at the local, or district, and the state levels.

CHAPTER FIVE

Conclusions

This research was conducted to examine the influence of PLC training as it is integrated into the K-12 educational school setting utilizing the Benchmark Assessment Tool (BAT). The BAT allows for the analysis of teachers' attitudes as they completed the Missouri Professional Learning Communities (MPLC) Project training. The BAT's purpose was to measure the attitudes and behaviors of teachers in different stages of the MPLC training program. Within the BAT there are three specific domains assessed: collaboration, student learning, and teacher learning. The collaboration domain explores *how* teachers work together whereas the student learning domain considers what teachers use to learn more about the learning of their students, and finally, the teacher learning domain considers what teachers do to attend to their own PD. Within these three domains there exists a series of benchmarks and specific practices that define the conditions in order for an organization to sustain the PLC philosophy of operation as established within the MPLC Project goals and objectives. This chapter presents a summary of the research and findings, then will draw key conclusions from the data. Chapter five concludes with recommendations for future studies and research, and any implications the current study may have for PLC reform efforts at the district and the state levels.

Summary of Purpose

The mission of the MPLC Project is to support Missouri schools in building and sustaining PLCs where collaborative cultures result in high levels of learning for all and increased student achievement (Gordon & Smith, 2015). PLCs are the “what” of school improvement, and the practices of teachers' data teams, within PLC practices, serves as the “how” (Peery, 2011). Prior investigations of collaborative teams have provided new knowledge

and new perspectives that have the potential to influence overall school improvement tactics. The positive effects of PLCs are consistently reported in educational research examining if student achievement is impacted as a result of PLC implementation. Numerous studies connect teacher collaboration that is focused on teaching and learning with increased student achievement (Blankstein, 2004; Lieberman & Miller, 2005; Newmann & Wehlage, 1995). In order to understand how teachers perceive the development of PLCs in one state model, this study examined the changes in teachers' perceptions within the three domains of collaboration, teacher learning, and student learning utilizing results gathered over a three-year period from the BAT survey instrument.

The following research questions guided this study:

Research Question One: Are there perception differences on the level of PLC implementation as measured by the BAT between the leadership team (LT) teachers that received direct instruction from the MPLC resource specialists and the collaborative team (CT) teacher population from year to year of the MPLC Project training?

Research Question Two: Are there perception differences on the level of PLC implementation as measured by the BAT for the leadership team (LT) teachers that received direct instruction from the MPLC resource specialists and the collaborative team (CT) teacher population from the beginning of the MPLC Project training to the end of the MPLC Project training?

Research Question Three: Are there notable perception differences on the level of PLC implementation as measured by the BAT that exist year to year between the leadership team (LT) teachers that received direct instruction from the MPLC resource specialists

versus the collaborative team (CT) teacher population based upon the grade configuration of the respondent's school?

Research Question Four: Are teachers' perceptions on the level of PLC implementation as measured by the BAT more responsive to training towards one domain over another regarding the influences of the MPLC Project training on the domains of collaboration, teacher learning and student learning from the initial year to the final year of the PLC implementation process?

Demographic Data and Patterns

The BAT survey only contains three demographic questions. The BAT is designed to keep members' responses anonymous and was only able to reveal the respondent's primary role, a descriptor of the type of involvement the individual had in the PLC implementation process, and finally, the RPDC region in which the training was delivered. This study is dominated by an elementary influence which is representative of the teacher population in Missouri. There are a total of 64,866 K-12 public education teachers in the state of Missouri in which 50% are elementary, 18% are middle school or junior high teachers, and 31% high school teachers (MO School Directory, 2016). Roughly half, 49%, of the CT and over half, 52%, of the LT respondents are elementary teachers. The middle school represents upwards of 20% of the respondents while the high school makes up practically a third, 30%, of the CT teachers yet only comprises 25% of the LT teachers.

Research Question Conclusions

Research Question One: Are there perception differences on the level of PLC implementation as measured by the BAT between the leadership team (LT) teachers that

received direct instruction from the MPLC resource specialists and the collaborative team (CT) teacher population from year to year of the MPLC Project training?

The first research question examined three comparisons of the CT teachers to the LT teachers' perceptions by year of implementation in the MPLC Project training program. This comparison included all teachers in grades K-12. The first comparison surveyed the possible differences between the CT teachers and the LT teachers in year one of the MPLC Project training. The year one, as well as the year three comparison between the CT teachers and the LT teachers, yielded no statistically significant differences.

In spite of the wisdom derived from Hindin et al. (2007) who argued that, "Learning from colleagues requires both shifts in perspective and the ability to listen hard to other adults, especially as these adults struggle to formulate thoughts in response to challenging intellectual content" (p. 372), teachers find it difficult to change their daily practices. Interactive dialogue expands the expertise of individuals by utilizing the pooled experiences of multiple people. PD in the form of teacher collaboration is one of the venues teachers utilize to maintain a sense of mission that challenges adult learners to evoke the courage to challenge mainstream knowledge. The lag in the statistically significant findings in year one supports the idea that listening to our peers is challenging, even for adults who respect one another.

One would expect that the LT teachers' attitudes would be different than the CT teachers' attitudes in year one of the training due to the direct instruction the LT teachers' received over the course of the six months prior to the administration of the BAT survey. However, the lack of statistically significant results indicated that the direct instruction the LT teachers received during the training does not really make much of a difference when comparing the CT teachers' perceptions to the LT teachers' perceptions.

Although there was a statistically significant difference in year two of the training when comparing the CT teachers' perceptions to the LT teachers' perceptions, one could surmise that the two groups are not different during year three at the conclusion of the training because the changes in practice that have led to a change in the culture and PLC practices and beliefs are normalized into the school culture. At the conclusion of the training it is desirable for the groups to share similar practices, and hence beliefs and attitudes regarding PLC practices. Therefore, all forms of training were effective, as indicated by the narrowing of the standard deviation variance moving closer towards zero indicating less variance in the responses. The direct instruction the LT teachers received did not produce a statistically significant difference in the LT teachers' perceptions and attitudes compared to the CT teachers' perceptions and attitudes who received secondary instruction.

Research Question Two: Are there perception differences on the level of PLC implementation as measured by the BAT for the leadership team (LT) teachers that received direct instruction from the MPLC resource specialists and the collaborative team (CT) teacher population from the beginning of the MPLC Project training to the end of the MPLC Project training?

Research question two evaluated the differences on the level of PLC implementation as measured by the BAT from the sample population of CT teachers and then the LT teachers from the beginning of the MPLC Project (year one) to the end (year three) of the MPLC Project. There was a statistically significant difference in both the CT teachers and the LT teachers from the beginning to the end of the training period. Therefore, it can be assumed that all types of training had a positive effect on the teachers' perceptions regarding the MPLC training practices. This belief is also supported by the constriction of the standard deviation variance moving closer

towards zero indicating less variance in the responses from the beginning to the end of the training period. The sample means of the year one teachers compared to the year three teachers for both the CT teachers' and the LT teachers' groups indicates there has been a positive change in teachers' attitudes and the results are not attributed to chance. In summary, the data indicated that both the CT and the LT teacher populations benefitted from the MPLC Project training but since these results were noted for all types of training, time may be the key variable in the success of the program rather than the type of instruction the teachers received.

An interesting comparison to the results from research question two is how DuFour (2005) characterized "powerful collaboration" as a "systematic process in which teachers work together to analyze and improve their classroom practice" (p. 36). The data in research question two indicated that teachers benefited from the MPLC Project training supporting O'Neill and Conzemius' (2002) assertion that "schools showing continuous improvement in student results are those whose cultures are permeated by: a shared focus, reflective practice, collaboration and partnerships and an ever increasing leadership capacity characterized by individuals who focus on student learning, reflect on student assessments and learn as a collaborative team" (p. 15). However, exactly what type of training is optimal remains elusive.

Research Question Three: Are there notable perception differences on the level of PLC implementation as measured by the BAT that exist year to year between the leadership team (LT) teachers that received direct instruction from the MPLC resource specialists versus the collaborative team (CT) teacher population based upon the grade configuration of the respondent's school?

Research question three examined the notable perception differences on the level of PLC implementation as measured by the BAT that exists year to year between the leadership team

(LT) teachers that received direct instruction from the MPLC resource specialists compared to the collaborative team (CT) teacher population based upon the grade configuration of the respondent's school. The three grade configurations in this study sample were elementary, middle school, and high school. Research question three evaluated if one grade configuration was more responsive to training than another when evaluating teacher perceptions within the teachers' grade configurations and the year of training.

Elementary Teacher Findings

Research question three is similar to the first research question in examining the differences between the CT teachers and the LT teachers, however, research question three is also interested in determining if there are any differences based upon the grade level of the teacher. There was no statistical significance when comparing the elementary CT teachers' attitudes to the elementary LT teachers' attitudes in any of the years of implementation during the MPLC Project training. Training made no difference when comparing the elementary CT teachers to the elementary LT teachers. This could be attributed to the fact that both groups are receiving training and over time the benefit is realized when comparing the progress of each group of teachers.

Although there were no statistically significant differences when comparing the elementary CT teachers to the elementary LT teachers during year one, year two, or year three respectively, there was a statistically significant difference noted when comparing the year one elementary CT teachers to the year two elementary CT teachers. The elementary CT teacher's sample population mean in year one was 1.320 and improved to 1.196 in year three of the training indicating that the group is positively changing perceptions toward the MPLC Project goals. A third affirmation that something is impacting the CT teacher's perceptions occurred upon reviewing standard deviations. The data indicated the overall variance tightened from

0.319 to 0.251 from year one to year three of the CT teacher's training period. Likewise, there was a statistically significant difference noted when comparing the year one elementary LT teachers to the year two elementary LT teachers indicating that each group was progressing in the evolution of their behaviors and attitudes as they progress through the MPLC training. Similar to the elementary CT teachers, the elementary LT teacher's sample population mean in year one was recorded at 1.373 and improved to 1.204 from year one to year three. Another indication of success for the training program is the decrease in variance when analyzing the change in standard deviation in year one from 0.325 to 0.242 in year three for the elementary CT teachers. Overall, success was noted in the experience of the teachers as they progressed through the training rather than the training itself impacting the teachers' perceptions.

The CT teachers demonstrated the most consistent growth in terms of their sample means moving towards the value one, indicating Yes, or agreement, as well as the narrowing of their standard deviation when comparing year one to later years which is reminiscent of less variance in the teachers' attitudes. There was not a statistically significant change in the elementary LT teachers' attitudes between year two and year three of the training period; however, the results were borderline significant meaning that there was statistical significance at the alpha level of 0.10. The teachers' attitudes from year one to year three denoted a statistically significant growth in overall teacher perceptions indicating that the experience teachers gained from the training over time was an effective determinant in identifying teachers' changes in perceptions during the training. For elementary teachers in both the CT teacher sample population and the LT teacher sample population, it appears that time and any kind of training were the effective ingredients in evolving teachers' practices and attitudes towards achieving PLC goals.

Middle School Teacher Findings

Statistically significant relationships for the sample population of middle school teachers were associated with year three of the training period regardless of whether the teacher was associated with the CT or the LT teachers' sample population. There were no statistically significant relationships at the middle level in year one, or in the comparisons in the sample means from year one to year two, for any of the comparisons of the CT or the LT teachers' perceptions. However, there was a statistically significant comparison that emerged when comparing both the year two CT teachers to year three CT teachers' perceptions and the year two LT teachers to year three LT teachers' perceptions as well as the year one CT teachers to year three CT teachers' perceptions and the year one LT teachers to the year three LT teachers' perceptions. The year one CT teachers' sample population mean began at 1.427 and progressed to 1.348 over the course of the training. The decrease in variance was marked by a beginning standard deviation during year one of 0.367 moving towards 0.304 in year three of the training.

Grade configurations may have a difference because of the development of expectations due to how the teacher teams interact and share students. For example, elementary teachers have fewer overall students for longer periods of time whereas middle & high school teachers have more students for shorter periods of time than their elementary counterparts. Middle school teachers typically work in smaller groups than their high school peers but in proximity to one another on mixed content teams. Teachers are all participants in the PLC experience in one way or another if they are respondents to the BAT (Gordon, 2013). But due to the configuration of the school setting and the availability of teacher interactions throughout the day, it could be assumed that the training was effective but may take a longer period of time to develop statistically significant relationships at the secondary level than it does at the elementary level.

High School Teacher Findings

The lack of statistically significant results at the secondary level supports Hipp and Huffman's (2002) position that schools struggle with the successful implementation of the PLC design if traditional mindsets prevail. Although the scattered results cannot be used to explain the overall effect, there were pockets of statistically significant relationships which could be attributed to a lack of fidelity to adhering to the process. Secondary teachers work more in isolation than their elementary counterparts due to the structure of the organization. High school teachers work as content experts rather than in grade level teams typical of the elementary teachers. A clear picture of the findings was difficult to interpret for the high school teachers. There was not a statistically significant difference between the CT teachers and the LT teachers until year three of the training. Both year one and year two did not show a statistically significant difference between the CT teachers and the LT teachers, however, in year three of the training there was a statistically significant difference between the CT teachers' perceptions and the LT teachers' perceptions.

Teachers that are not changing practices tend not to change their perceptions. It was noted that the LT teachers' sample population only recorded a statistically significant relationship when comparing year one LT teachers to year two LT teachers' perceptions. There were no statistically significant differences between the year two LT teachers and the year three LT teachers nor was there a statistically significant difference between the year one LT teachers and the year three LT teachers. In fact, the sample population means increased from 1.365 in year two to 1.424 in year three. This increase was also noted in the variance represented an increase in the standard deviation in this same time period from 0.314 to 0.321. Research has shown that PLC efforts are believed to be one of the most promising ways to improve student

outcomes (DuFour et al., 2004; Hord, 2004; Joyce, 2004), yet the understanding of the construct and the practical workings of PLCs remain elusive (Louis, 2007; Prestine & Nelson, 2005). Senge's (2000) learning organization theory, DuFour's (2005) collegial school improvement model, along with Hord's (2004) development framework of the PLC all share the idea that in order to ensure that a learning organization thrives there must be a shared sense of purpose that is communicated, shared and embodied in the everyday structure of the work to be done. The secondary data did not support this idea of a shared commitment in the same manner as the elementary teachers, suggesting the difficulty in changing a culture that is more siloed and isolated. This assumption follows the conviction of Moirao et al., (2012) who stated that a collection of teachers working in isolation cannot produce the same results as teachers who share and develop practices together.

Without the presence of statistically significant findings for the teachers receiving direct instruction, it seems implausible to suppose that the high school LT teachers can execute effective training for the high school CT teachers, yet the high school CT teachers revealed a statistically significant relationship when comparing their perceptions for each year of the training. The findings of the high school LT teachers revealed no statistically significant changes for year one to year three. However, there was a statistically significant difference in the sample population means for the CT teachers when comparing year one to year two, year two to year three and also when comparing year one to year three of the training. This evidence seems to indicate, again, that the type of training did not matter as much as the high school CT teachers' time and experience working together. The high school CT teachers were a more powerful group in terms of impact in perceptions and attitudes according to the presence of the

statistically significant relationships. This suggests the need for more research on the training methods for PLCs.

Research Question Four: Are teachers' perceptions on the level of PLC implementation as measured by the BAT more responsive to training towards one domain over another regarding the influences of the MPLC Project training on the domains of collaboration, teacher learning and student learning from the initial year to the final year of the PLC implementation process?

The analysis of the three MPLC Project domains of collaboration, teacher learning and student learning revealed that there is a statistically significant relationship in each domain when comparing the CT teachers' perceptions over time and again with the LT teachers' perceptions over time. An interesting comparison of these findings is with the work done by Chappuis, Chappuis, & Stiggins (2009) who conducted research regarding effective PD that revealed that the best opportunities are those that are job embedded, sustained over time, and centered on student's achievement. The support of the statistically significant findings for research question four further supports this supposition of effective PD as it relates to the three domains studied. Both the CT teachers and the LT teachers displayed statistically significant differences for each of the three domains when comparing year one to year three. This evidence supports the assumption that experience is more influential than type of training to change teachers' perceptions and behaviors.

What is less clear is when the transition in practices and perceptions occurred. The collaboration domain displayed a statistically significant relationship in years two and three but not in year one of the training when comparing the practices and attitudes of the CT teachers to those of the LT teachers. Although there were no statistically significant differences when comparing the CT teachers to the LT teachers in the teacher learning domain, there was a

statistically significant finding in year one in the student learning domain between the CT teachers and the LT teachers. However, after year one, there was not another statistically significant relationship in the student learning domain. This could be attributed to the lack of flexibility within the high school framework which would hinder a change in practice. Without a change in practice it would be inconceivable to think one would be able to change perceptions and attitudes in order to produce statistically significant findings in subsequent years (Hipp and Huffman, 2002).

Conclusions

There are five key conclusions from this study. First, the impact of time and experience was more significant when evaluating teachers' progress towards changing their perceptions and behaviors to implement PLC goals than the type of training the teachers received. Of the 12 relationships measured over time in this study, 11 were statistically significant differences when comparing the relationship from year one to year three. Year to year statistically significant differences were lacking in this study, however, when comparing year one to year three there were several statistically significant differences which underscores that change takes time and one shot professional development is not likely to work. Five of the six statistically significant relationships were found in the calculations for research question three. The relationships between the CT teachers from year one to year three at the elementary, middle school, and high school grade levels were statistically significant relationships. Similarly, the LT teachers' relationships indicated a statistically significant relationship at both the elementary and the middle level but not at the high school grade level. The remaining six statistically significant relationships were found in research question four. The data suggested that each of the three MPLC Project domains that were studied had a statistically significant influence on teacher

perceptions during the three-year study when comparing year one to year three for both the CT teachers and the LT teachers. These relationships were statistically significant regardless of membership as a CT teacher or a LT teacher or the grade level span or domain studied. Time and experience rather than type of training made an impact on teachers' perceptions. The conclusions drawn from this study were based on the statistically significant comparisons as well as those comparisons that were not statistically significant. The comparisons that were not statistically significant in this study were the comparisons between the CT teachers and the LT teachers for each of the three grade levels studied regardless of the year of training a teacher was participating in or which domain was being investigated. The CT teachers were in a train-the-trainer model yet their perceptions were found to be as strong as the LT teachers who were directly trained by the MPLC resource specialists. The lack of statistically significant differences could be attributed to the LT teachers' training which was more theoretical and generic compared to the site specific training the CT teachers experienced. Overall, 15 of the 21 comparisons made in search of a statistically significant relationship between the LT teachers and the CT teachers during each year of the training did not yield a statistically significant relationship. Due to the lack of statistically significant findings, it was determined that the particular type of training did not have an impact on the teachers' attitudes or perceptions related to the PLC implementation training. Therefore, it was concluded that time and experience are what impacted teachers' attitudes and perceptions during the training period.

These findings support the research that the most effective types of PD are those that are job embedded, sustained over time, and centered on student achievement (Chappuis, Chappuis, & Stiggins, 2009). Just as time and experience had an impact on teachers' beliefs, time and experience have also shown to have an effect on the development of the PLC culture within a

school. Schools build on the experiences of each of their faculty members (Beauchum & Dentith, 2004; Hargreaves, 2005), and support those same teachers through effective PD (DuFour & DuFour, 2013) in which effective schools emerge from collaborative practices (American Federation of Teachers, 2007; Learning Point, 2007; Lieberman & Miller, 2005). Teachers learn through both formal and informal structures as collegial relationships develop to enhance the professional growth of teachers over time. Current PD models are moving towards unconventional learning opportunities such as edcamps with no preset agenda that is driven by the conversations and discussions of the most pressing concerns related to teaching and learning (NASSP, 2017). Connectathons are another unconventional PD method which allows for opportunities to plug-in with leaders in the field through the use of social media tools. What this study did not show, however, was which particular type of training made a difference. Given the nature of the LT training it was assumed it would have more of an impact on the LT teachers compared to the CT teachers. It did not.

Second, elementary teachers are more adaptive to the goals of this PLC initiative than the middle school and high school teachers. The elementary teachers' descriptive statistics present a case to clearly point out that both the Elementary CT teachers and the Elementary LT teachers are more responsive to the training than their secondary peers in the middle school and high school. The mean score for the elementary CT teachers was 1.19 in year three which showed a much greater level of agreement in teacher perceptions towards the training than the middle school CT teachers mean which was calculated to be 1.348 or the high school CT teachers which was computed to be 1.334. Similarly, the elementary LT teachers' mean score was 1.204 whereas the middle school LT teachers' mean was found to be less in agreement at 1.237 or the high school LT teachers' mean which was found to be 1.424. Traditionally, elementary schools

have a smaller staff than a middle school or a high school which provides the opportunity to develop more close knit and trusting relationships for elementary teachers. Working together in grade level teams is common for elementary teachers due to the organizational structure of most elementary schools. Since elementary teachers are naturally structured to work in grade level teams, it would be a natural transition to move towards collaboration which simply outlines *how* teachers work together. DuFour's (2005) assertion lends support to the idea that elementary teachers can use PLCs to act as a support system for teachers as they shift from the traditional focus on teaching to a renewed PLC focus on student learning goals. The support that elementary teachers garner from the close knit relationships also voids Little's (2003) acknowledgement of constrained risk taking which defines the ways in which teachers are both free to be innovative but also fear failure which constrains the ways teachers approach their work. Working collaboratively can enable the success of PLCs when teachers have a deep understanding of the positive impact their actions have on student outcomes. When teachers are immersed in PD that is structured as active learning with a coherent focus on content knowledge, teachers have reported that they believe their knowledge and skills grew and their practice changed as a result of the learning (Darling & Hammond, 2009). Five out of six mean differences in the population samples of the elementary CT teachers and the elementary LT teachers were statistically significant with the sixth being borderline significant. One area that did not display this same pattern was in comparing the elementary CT teachers to the elementary LT teachers between years of practice. This study supports the idea that working together over time had an impact and teachers seemed to learn to collaborate regardless of the PD provided. As suggested in the first conclusion, experience in the system could be said to be as important as the type of training received.

The third conclusion from this study is that the collaborative relationship is a key to successful PLC implementation when it is considered that both experience and time matter. Collaboration in the context of this study was the examination of how teachers work together. The quality of teacher collaboration as a mode of effective PD is a recurring theme in educational literature that has been promoted as a factor contributing to school improvement and teacher development (DuFour, 2014; Little, 1999; Hord, 1997; Darling-Hammond & Richardson, 2009; Darling-Hammond, 2015). The importance of fostering participation and working collaboratively in a climate of mutual respect is found in the principles of adult learning theory (Moore, 1988). When comparing the CT teachers' perceptions to the LT teachers' perceptions, the presence of a statistically significant relationship existed in the collaborative domain for years two and three but not in the teacher learning or the student learning domains. Likewise, when evaluating the relationship of both the CT teachers' perceptions over time and the LT teachers' perceptions over time regarding collaboration, there was always the presence of a statistically significant relationship. This could be attributed to the heart of the PLC framework being grounded in the ability of teachers to collaborate just as the literature suggests (Desimone et al., 2002; Hipp & Huffman, 2002; Robbins & Alvy, 2003; Hord, 2004; DuFour et al., 2004; Joyce, 2004; Prestine & Nelson, 2005; Louis, 2007). Ongoing PLCs are the bedrock of the work that creates a whole school of effective teachers (Routman, 2012).

Fourth, as suggested in the first conclusion, the train-the-trainer model actually worked to administer the PLC framework in all K-12 settings. The CT teachers were in a train-the-trainer model, yet their perceptions were found to be as strong as the LT teachers who were directly trained by the MPLC resource specialists as indicated by the lack of statistically significant differences when the perceptions of the training for the two groups were compared. There were

no statistically significant differences at the elementary level and only the year three comparison between the CT teachers and the LT teachers proved to be a statistically significant difference at the middle school and high school levels. The only comparisons that yielded statistically significant differences between the CT teachers and the LT teachers was in the collaborative domain for each of the three years of training. This conclusion can be tied to The National Staff Development Council's (NSDC, 2013) model of teacher collaboration that impacts student achievement and the collaborative frameworks of experts such as Hargreaves (1994), DuFour (2005), and Hord (2004) who asserted that several common elements support effective collaboration, including dedicated teacher collaboration time and grade level teams working together to share best practices with an instructional focus. It may be that both the LT teachers and the CT teachers got these critical elements in their training. PD activities that allow teachers to work collaboratively to plan and reflect on instruction are positively valued by teachers due to the direct relationship to their motivation to help students learn (Bill & Melinda Gates Foundation, 2010). Collaboration between teachers allows the development of trust within the team of teachers. Once the culture of trust has been developed within the team, collegial relationships enable true collaboration between groups of teachers, which is supported by Datnaw, Park, & Wohlstetter's (2007) study of urban schools across the United States that brought awareness to the importance of collegial relationships. Administrative support and a trusting faculty can enable the collaborative groups to interact like families. This means the group can trust, disagree and argue. Apparently, these or other elements of the PD in the MPLC Project were similar enough in both types of training.

Finally, the literature suggests that PLCs impact student performance which was not measured in this study, but the positive growth in teacher perceptions about student learning and

teacher learning over time suggests that students would be positively impacted. The literature on PLCs suggests an impact on student performance is inherent when PLCs are successfully implemented (O'Neill and Conzemius, 2002; DuFour, 2005; Lieberman & Miller, 2005; Reeves, 2006; American Federation of Teachers, 2007; Learning Point, 2007) which can only be achieved through effectively assisting teacher learning opportunities. The statistically significant relationships from year one to year three when comparing both the CT teachers' perceptions regarding student learning and teacher learning as well as the LT teachers' perceptions regarding student learning and teacher learning supported the belief that both student learning and teacher learning were impacted over time despite the type of training the teachers received. Gallimore et al. (2009) concluded that students in schools where teacher teams collaborate using a protocol to solve instructional problems significantly increased student achievement over the comparison groups of schools where that structure of professional learning was lacking. Furthermore, time spent on the development of an instructional solution through teacher collaboration and focus allowed teachers to see causal connections to foster the acquisition of key teaching skills and knowledge, such as identifying student needs, formulating instructional plans, and the use of evidence to refine instruction (Gallimore et al., 2009). Datnaw, Park, & Wohlstetter (2007) expanded on Gallimore et al.'s (2009) view of professional learning to assert that professional relationships that can trust, disagree and argue lead to an effective collaborative culture through regularly scheduled, and uninterrupted, collaborative time which also supports Hargreaves's (1994) ideas on the components of collaboration which are essential to professional learning and student achievement. Finally, the National Staff Development Council (NSDC, 2013) also identified common features of PLCs that impact student achievement and affect many of the same elements present in Hargreaves (1994) and DuFour's (2005) models.

With the exception of the high school LT teachers, the statistically significant relationships in both the CT teachers and the LT teachers perceptions when comparing year one to year three of the training for the elementary, middle school and high school teachers support the belief that the significance of this research lies in the understanding that teachers are more likely to move towards action when feelings of support and time are given to the implementation of a school improvement initiative when consideration for teachers' current beliefs and attitudes are acknowledged. Senge (2000) pointed out that conversation is considered to bridge the gap between individual and organizational learning processes, although it is suggested that genuine dialogue is very difficult to achieve because it does not favor the influence, or acceptance, of certain voices (Oswick, et al., 2000). The antithesis of collaboration is isolationism which is common in high school teaching due to factors such as a focus on content material and the restrictive daily time schedule in high schools. The results at the high school level were difficult to capture perhaps due to their lack of opportunity for collaborative time as a result of their restrictive daily time schedule as pointed out earlier. There was not a statistically significant difference when comparing the CT teachers to the LT teachers until year three of the training which did prove to be statistically significant. However, both year one and year two did not show a statistically significant difference when comparing the CT teachers to the LT teachers. Teachers that are not changing practices tend not to change their perceptions. It was noted that the high school LT teachers' sample population only recorded a statistically significant relationship when comparing year one high school LT teachers to year two high school LT teachers' perceptions. There were no statistically significant differences between the year two LT teachers and the year three LT teachers nor was there a statistically significant difference between the year one LT teachers and the year three LT teachers. If teachers are not

collaborating then they must be working in isolation or “fragmented individualism” which is the term used to describe the school culture that exists when teachers practice in isolation, independent of each other (Hargreaves, 1994). The finding in this study on the power of collaboration over time is evident at the elementary and middle levels but similar conclusions are difficult to determine at the high school level.

According to Barth (1990), “Collegiality requires that everyone be willing to give up something without knowing in advance just what that may be. But the risks and costs of interdependence are nothing next to the risks and costs of sustaining a climate of emotional toxicity, of working in isolation” (p. 31). This awareness further supports the need for additional studies to investigate the progression of teacher attitudes during the implementation phase of a school improvement initiative such as a PLC. Reeves (2006) has determined that in “schools where leadership teams primarily attributed student achievement to faculty variables, an average of 64.8 percent of students scored proficient or higher on those assessments” (p. 7).

Reeve’s research is further supported by Elster’s (2010) conviction that before there is an expectation of teacher action, there should be considerable effort put into developing the time and resources to alter teacher attitudes and beliefs. The findings in this study support the idea that when teachers are given a clear focus and time to expand their professional experiences powerful collaboration between colleagues will develop to enhance both student learning and professional learning. This study supports the idea that working together over time had an impact and teachers seemed to learn to collaborate regardless of the PD provided.

This study adds to the literature base for quantitatively studying teachers’ perceptions during the implementation of a PLC initiative. This study found five key conclusions when studying teachers’ perceptions and behaviors during the implementation of a PLC initiative.

First, the impact of time and experience was more significant when evaluating teachers' progress towards changing their perceptions and behaviors to implement PLC goals than the type of training the teachers received. Second, elementary teachers are more adaptive to the goals of this PLC initiative than the middle school and high school teachers. Third, the collaborative relationship is a key to successful PLC implementation when it is considered that both experience and time matter. Next, the train-the-trainer model actually worked to administer the PLC frameworks in all K-12 settings. Finally, PLCs likely impact student performance due to the positive growth in teacher perceptions regarding both student learning and teacher learning over time.

Recommendations for Further Study

The following recommendations for further research can be made based upon the findings from this research study:

1. This survey was inclusive of educators, in the state of Missouri, who were part of a distinct initiative for PLCs. Most PLC literature is elementary based and there is much to learn about what works in the secondary setting. A clear picture of the findings was difficult to interpret for the high school teachers in this study. There was not a statistically significant difference in the LT teachers' perceptions after the year one to year two comparison for the high school teachers which is difficult to interpret. Both the elementary CT teachers and the LT teachers, on the other hand, displayed either statistically significant differences or borderline statistically significant relationships for all teachers regardless of year examined. This study revealed that time and experience were more significant than the type of training the teachers received when evaluating teachers' progress towards changing their

perceptions and behaviors during the implementation of PLC goals. In order to expand upon this major finding, the recommendation for further study would be to conduct a controlled study design in order to determine what, if any, type of training would make an impact. The utilization of a control group that is immersed in the PLC culture without the support of formalized PLC training would be compared to the experimental group that would be receiving training in order to determine if training is relevant. The findings would help evaluate if training is needed to support and maintain the expectations of a PLC culture.

2. Only the domains of collaboration, teacher learning, and student learning were studied as they related to professional learning with the PLC model. Further investigation into how these items were presented and implemented might provide additional insight into the lack of significant differences within the three-year time span. Each domain displayed statistically significant differences for both the CT teachers and the LT teachers when comparing year one to year three, however, there were mixed results when looking for patterns within each individual domain from year to year. One pattern that consistently emerged was that type of training was not as significant as the time and support given to teachers. Broadening the scope of the study might include additional aspects of professional learning that may provide different results within the educational arena such as teacher driven PD.
3. Despite the LT teachers all partaking in the same training regardless of grade configuration, there was no examination of the fidelity of the implementation practices at the various grade levels. Perhaps a study that observed both the

implementation of the program as well as the trainer at each site would provide for more insight into the actual training that took place.

4. A parallel study aimed at discovering administrator perspectives is needed. A study of this nature would allow researchers to establish an understanding of the perceptions of the reform model from teachers through district administration points of view. This study included only teachers and teachers on leadership teams.
5. Participation in the BAT survey was strongly encouraged, but not mandatory, for all teachers within the MPLC Project participating schools. Perhaps future studies should utilize a random sampling to garner a more generalizable view of perceptions. Additionally, the implementation of a baseline survey prior to program implementation would be worthwhile to assess teacher beliefs prior to training to truly measure real growth.
6. Varying school demographics such as a school's socio-economic status or geographic location such as urban, suburban, and rural all could have differing effects on teachers' attitudes and perceptions during the implementation phase of an initiative. It would be interesting to investigate how these factors contribute to a difference in research findings.

Implications for Practice

The results of this research study have implications for those at the local, state, and federal level who are in charge of teacher leadership and school improvement initiatives. The perceptions of teachers who have undergone three years within a consistent training model has provided a quantitative view of the MPLC Project which is grounded in the three domains of collaboration, teacher learning, and student learning. This study could assist school leaders work

with the Missouri Department of Elementary and Secondary Education to create a reform effort that allows teacher collaboration to satisfy teacher PD requirements when supported with student learning data.

Selecting the appropriate reform effort is crucial in order to facilitate the growth needed to meet the challenges educators must overcome in order to ensure the initiative brings forth a successful outcome for teachers. This study revealed that time is more important than the type of training. This is especially true when evaluating the relationships between the CT teachers and the LT teachers. Evaluating the type of training yielded random results yet the experience of working collaboratively over time yielded the most positive results for teachers at all levels K-12. This study supports the notion that given time and support, the experience of working collaboratively yields positive results.

Schools are challenged with meeting the increased call for accountability as demonstrated by demands for increased outcomes on annual performance reports that begin at the local level. This study supports the idea that goal directed opportunities to work collaboratively will yield positive results. Both the CT teachers and the LT teachers represented statistically significant differences on each of the three domains when examining year one to year three relationships. This implies that given time and support, educators can have a profound effect on collegial collaboration, teacher learning and student learning.

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Appendix A:

BAT Survey Instrument

Survey Link: https://missouri.qualtrics.com/jfe/form/SV_5yCM74moKE8bQZD

3 Demographic Questions answered by Teachers, Leadership Team, & Admin:

1. Please choose your region.
 - a. Please choose your Southeast area school.
 - b. Please choose your Kansas City area school.
 - c. Please choose your Northeast Area School.
 - d. Please choose your Kansas City/Northwest area school.
 - e. Please choose your South Central area school.
 - f. Please choose your Southwest area school.
 - g. Please choose your St. Louis area school.
 - h. Please choose your Central region school.
 - i. Please choose your Columbia area school.
2. What is your primary role?
 - a. building administrator
 - b. general education teacher
 - c. special education teacher
 - d. other role
3. Choose the best descriptor of your involvement in the PLC implementation process.
 - a. Administrator leading/participating in the PLC process
 - b. PLC building leadership team member
 - c. Collaborative team member
 - d. Staff member not engaged in collaborative work

15 Questions answered by Collaborative Team Teachers & Leadership Team Teachers:

4. Our mission and vision guides the decisions and actions of the school, focusing on student learning.
 - a. Yes
 - b. Partially
 - c. No
5. I believe that collaboration through PLC teams will improve the education we provide to all our students.
 - a. Yes
 - b. Partially
 - c. No

6. I am a member of a PLC collaborative team that encourages sharing of ideas.
 - a. Yes, sharing ideas is generally encouraged.
 - b. Partially, we occasionally share ideas.
 - c. No, the team culture is not conducive to sharing ideas.
7. I am a member of a school that regularly celebrates successes.
 - a. Yes, we plan time for celebrating our successes.
 - b. Partially, we occasionally celebrate successes.
 - c. No, the team culture is not conducive to celebration.
8. Building administrators seek input from PLC teams in making school-wide decisions affecting collaboration and instruction.
 - a. Yes, for a majority of school-wide decisions.
 - b. Partially, limited to a few major decisions and/or to minor decisions.
 - c. No, decisions are made autonomously by administration.
9. The school schedule allows time for frequent and regular collaboration.
 - a. Yes, we have time for collaboration at least twice monthly.
 - b. Partially, meeting times are monthly or less frequent.
 - c. No, meeting times are unscheduled or sporadic.
10. I am a member of a collaborative team that uses an agenda, norms, and team protocols to keep our meetings on track.
 - a. Yes, we rely on a planned agenda, team norms, and protocols to keep us organized.
 - b. Partially, we sometimes follow an agenda, norms, or protocols.
 - c. No, we do not typically follow an agenda, norms or protocols.
11. I am a member of a team that uses meeting records and other tools to regularly monitor and review our teaming practices (at least 3 times per year).
 - a. Yes, we regularly monitor and review our teaming practices (at least 3 time per year).
 - b. Partially, we occasionally review our teaming practices (1-2 times per year).
 - c. No, we do not review our teaming practices.
12. The team I regularly collaborate with takes time to discuss and reflect upon instructional strategies and their effectiveness.
 - a. Yes, we plan time in our agendas to discuss our teaching successes and challenges.
 - b. Partially, sometimes we discuss teaching successes or challenges but this depends on time available and/or willingness of the team.
 - c. No, we do not discuss effective teaching or teaching challenges as a team.

13. I am a member of a PLC collaborative team that uses student data to drive problem-solving and decisions.
- a. Yes, we routinely review data to inform problem-solving and decisions.
 - b. Partially, we try to link data to problem-solving and decisions.
 - c. No, there is no link between data, problem-solving and decisions.
14. As a team we collaboratively established SMART goals and implement strategies and action plans based on student data.
- a. Yes, we have established SMART goals and implement strategies and action plans based on student data.
 - b. Partially, we have begun to establish SMART goals, but have not completely connected them to the implementation of strategies and action plans based on student data.
 - c. No, we haven't established SMART goals yet.
15. As a team we collaboratively identify and develop essential learning outcomes (also referred to as ELOs, Power Standards or Priority Standards).
- a. Yes, we have collaboratively identified and developed essential learning outcomes for our courses.
 - b. Partially, we have begun to collaboratively identify and develop essential learning outcomes, but are not completed.
 - c. No, we have not begun to identify and develop essential learning outcomes.
16. As a team we collaboratively identify and administer instructional strategies for addressing essential learning outcomes.
- a. Yes, we collaboratively identify, develop and administer instructional strategies related to essential learning outcomes.
 - b. Partially, we are in the process of identifying, developing and administering instructional strategies related to essential learning outcomes, but are not completed.
 - c. No, we have not begun to identify, develop and administer instructional strategies related to essential learning outcomes.
17. As a team we collaboratively identified common formative and summative assessment methods for assessing essential learning outcomes.
- a. Yes, we have collaboratively identified common formative and summative assessment methods.
 - b. Partially, we have begun to collaboratively identify common formative and summative assessment methods, but are not complete.
 - c. No, we have not begun to collaboratively identify common formative and summative assessment methods.

18. I have a clear understanding of how to use tiered interventions to support student learning needs.

- a. Yes, I am confident I understand.
- b. Partially, I somewhat understand.
- c. No, this is a new concept for me.

12 Leadership Team & Admin only Questions:

19. What was the extent of collaboration in developing the school-wide mission and vision?

- a. All staff (instructional and non-instructional) was involved.
- b. All instructional staff was involved.
- c. The leadership team with other instructional staff contributing.
- d. The administrator in partnership with another school leader.
- e. The administrator only.
- f. The mission and vision were established without input from building staff or administrators.

20. Describe when and how the mission and vision were collaboratively developed and/or reviewed.

- a. The mission and vision have been collaboratively developed and/or reviewed annually with input from all instructional staff and stakeholders.
- b. The mission and vision have been collaboratively developed by instructional staff, but have not been reviewed within the past year.
- c. The mission and vision are currently in the process of being developed collaboratively by the entire instructional staff.
- d. The mission and vision are currently in the process of being developed by the leadership team or a small team of staff members.
- e. The mission and vision exist, but were either handed down or adopted by the building without review.
- f. The mission and vision have NOT been developed and/or reviewed collaboratively within the past two years.

21. To what extent does instructional staff have a voice in making critical school-wide decisions affecting collaboration and instruction?

- a. All instructional staff have opportunities to be involved in decision making.
- b. The leadership team and a few additional staff are involved in making decisions.
- c. The leadership team and administrator make the critical decisions.
- d. The administrator in partnership with another school leader makes the critical decisions.
- e. The administrator alone makes all critical decisions.
- f. Critical decisions are made without consult of building administrators or staff.

22. To what extent do PLC teams effectively organize their collaboration by relying upon meeting schedules, planned agendas, and teaming norms?
- a. All teams effectively organize their collaboration by relying upon meeting schedules, planned agendas, and teaming norms.
 - b. A majority of teams effectively organize their collaboration by relying upon meeting schedules, planned agendas and teaming norms.
 - c. Some teams effectively organize their collaboration by relying upon meeting schedules, planned agendas and teaming norms.
 - d. Some teams use meeting schedules, planned agendas and teaming norms, but do so ineffectively.
 - e. A few teams inconsistently and ineffectively use meeting schedules, planned agendas and teaming norms.
 - f. No teams consistently use meeting schedules, planned agendas and teaming norms in their collaboration.
23. To what extent do school staff monitor and review teaming practices?
- a. All instructional staff knowledgeably and skillfully monitor and review effective teaming practices.
 - b. The leadership team and a few additional staff knowledgeably and skillfully monitor and review effective teaming practices.
 - c. The leadership team and the administrator knowledgeably and skillfully monitor and review effective teaming practices.
 - d. The administrator in partnership with another school leader knowledgeably and skillfully monitors and reviews effective teaming practices.
 - e. The administrator, OR another school leader only, knowledgeably and skillfully monitors and reviews effective teaming practices.
 - f. No one knowledgeably and skillfully monitors and reviews effective teaming practices.
24. How often do instructional staff have opportunities to reflect upon effective teaching practices and engage in shared learning?
- a. Regular, ongoing, and initiated by the staff.
 - b. Opportunities are often scheduled and initiated by administration and/or building leaders.
 - c. Opportunities are few, scheduled and initiated by administration and/or building leaders.
 - d. Opportunities are seldom only as critical needs arise.
 - e. Opportunities are once a year.
 - f. No opportunities are expected.

25. To what extent do school staff effectively use student achievement data for problem-solving and decisions?
- a. All instructional staff knowledgeably and skillfully use data.
 - b. The leadership team and a few additional staff knowledgeably and skillfully use data.
 - c. Only the leadership team knowledgeably and skillfully use data.
 - d. The administrator along with another school leader or data coach knowledgeably and skillfully use data.
 - e. Only the administrator OR data coach knowledgeably and skillfully use data.
 - f. No building staff or administrators hold knowledge or skills in using data.
26. To what extent do PLC collaborative teams focus on building level SMART goals?
- a. All PLC teams knowledgeably and skillfully implement building level SMART goals.
 - b. The leadership team and a few additional staff knowledgeably and skillfully implement building level SMART goals.
 - c. The leadership team only is knowledgeable and skillful in implementing building SMART goals.
 - d. The administrator along with another school leader or data coach holds the knowledge and skills for implementing building level SMART goals.
 - e. Only the administrator OR data coach holds the knowledge and skills for implementing building level SMART goals.
 - f. No building staff or administrators hold knowledge or skills in implementing building level SMART goals.
27. To what extent have instructional staff collaboratively identified and developed course essential learning outcomes (also called ELOs, Power Standards, or Priority Standards)?
- a. All instructional staff knowledgeably and skillfully collaborate to identify and develop course essential learning outcomes.
 - b. The leadership team and a few additional staff are knowledgeable and skillful in collaboratively identifying and developing course essential learning outcomes.
 - c. The leadership team ONLY has the knowledge and skills to collaboratively identify and develop course essential learning outcomes.
 - d. The administrator along with another school leader or data coach holds the knowledge and skills to identify and develop course essential learning outcomes.
 - e. Only the administrator OR data coach holds the knowledge and skills to identify and develop course essential learning outcomes.
 - f. No building staff or administrators hold knowledge or skills to identify and develop course essential learning outcomes.

28. To what extent do instructional staff collaboratively identify instructional strategies which are aligned with essential learning outcomes?
- a. All instructional staff knowledgeably and skillfully identify, develop and administer instructional strategies which are aligned with course essential learning outcomes.
 - b. The leadership team a few additional staff are knowledgeable and skillful in identifying, developing and administering instructional strategies which are aligned with course essential learning outcomes.
 - c. The leadership team ONLY are knowledgeable and skillful in identifying, developing and administering instructional strategies which are aligned with course essential learning outcomes.
 - d. The administrator along with another school leader or data coach holds the knowledge and skills to identify, develop and administer instructional strategies.
 - e. Only the administrator or data coach holds the knowledge and skills to identify, develop and administer instructional strategies.
 - f. No building staff or administrators hold knowledge or skills to identify, develop and administer instructional strategies which are aligned with course essential learning outcomes.
29. To what extent do instructional staff collaboratively develop common formative assessments aligned with instructional strategies and course essential learning outcomes?
- a. All instructional staff knowledgeably and skillfully collaborate to identify, develop and administer common formative assessments.
 - b. The leadership team and a few additional staff are knowledgeable and skillful in collaboratively identifying, developing and administering common formative assessments.
 - c. Only the leadership team has the knowledge and skills to identify, develop and administer common formative assessments.
 - d. The administrator along with another school leader OR data coach holds the knowledge and skills to identify, develop and administer common formative assessments.
 - e. Only the administrator or data coach holds the knowledge and skills to identify, develop and administer common formative assessments.
 - f. No building staff or administrators hold knowledge or skills to collaboratively identify, develop and administer common formative assessments.

30. What is the level of implementation of school-wide tiered interventions?
- a. School-wide implementation with benchmarking or universal screening at least 3 times per year.
 - b. Grade or course specific implementation with benchmarking or universal screening at least 3 times per year.
 - c. Grade or course specific with less frequent benchmarking or universal screening.
 - d. Benchmarking or universal screening tools are currently being selected and professional development is occurring.
 - e. Professional development is occurring.
 - f. No immediate steps or action taken toward implementation.

5 Admin Only Questions:

31. As a building administrator, how do you assure that the mission and vision impacts student learning?
- a. The mission and vision focus upon student learning (academic success, student success, student achievement, etc.) and are reflected upon and referenced in all collaborative decisions.
 - b. The mission and vision focuses upon student learning and is referred to regularly.
 - c. The mission and vision statements focus upon student learning, but are not referred to nor reflected upon regularly.
 - d. The mission and vision are in place, but don't specifically focus upon student learning.
 - e. Either the mission OR the vision are in place, but don't specifically focus upon student learning.
 - f. Neither the mission nor the vision exist.
32. As a building administrator, what resources and support are provided for the effective work of PLC collaborative teams?
- a. PLC teams meet weekly during the contract day and are teacher-led, focusing upon student learning and data-driven decision making.
 - b. PLC teams use an organized structure, meeting at least twice per month during the contract day, with a minimum of guidance from the building leadership team.
 - c. PLC teams meet less than 2 times per month, outside of the contract day, with the building leadership team making decisions for all/most of the teams.
 - d. PLC teams meet less than 2 times per month, outside of the contract day, and are loosely structured with the building principal leading.
 - e. PLC teams meet only as needed, and are generally led by outside facilitators.
 - f. PLC teams are not expected to meet on a regular basis.

33. From your perspective as a building administrator, to what degree is your school climate conducive to sharing, reflection and mutual support?
- a. Teacher-led teams share ideas and resources for problem-solving and decision making within and ACROSS teams.
 - b. PLC teams are teacher-led, and WITHIN teams, members share ideas and resources to problem-solve and make decisions.
 - c. PLC teams are beginning to be teacher-led, and are aware of and working through problems affecting group problem-solving and decision making.
 - d. PLC teams are in place, but need assistance to function, work through problems, and make decisions.
 - e. PLC teams are provided minimal opportunities to share and problem solve, relying on the building principal or an outside facilitator.
 - f. Teachers are provided no opportunities to work together to share ideas and problem solve.
34. As a building administrator, how do you encourage shared decision making?
- a. Collaborative teams regularly identify issues regarding collaboration and instruction, and directly contribute to plans for addressing those issues.
 - b. Input and feedback from staff is considered for critical decisions affecting collaboration and instruction.
 - c. Input and feedback from staff is regularly requested and used in non-critical issues, but infrequently in critical issues.
 - d. Input and feedback from staff is requested but not routinely used in making critical decisions.
 - e. Staff has input only on non-critical issues (i.e., treats for teachers, event titles and duty rosters, etc.).
 - f. Staff rarely is asked for input in critical decisions.
35. As a building administrator, what are your expectations for teams regarding the development, implementation, and sustaining of school-wide tiered interventions?
- a. A school-wide system of intervention is in place with all three tiers developed, and all staff are expected to be involved in providing data-driven interventions for students not learning.
 - b. A school-wide system of interventions is in place with all three tiers developed and a majority of staff members providing tiered interventions.
 - c. Time is scheduled for school-wide interventions with Tier 1 interventions in place and teachers expected to collaboratively develop Tier 2 and Tier 3 interventions.
 - d. Time is scheduled for school-wide interventions, and teachers are expected to collaborate in developing Tier 1 interventions.
 - e. We have scheduled intervention time, but teachers are largely on their own.
 - f. We have no school-wide interventions, and I expect teachers to provide student interventions in their classrooms as needed.

Appendix B:

Permission to Use BAT Survey Data

MEMORANDUM

DATE: March 26, 2015

TO: Kristina Martin

FROM: Michelle Smith, Data Coordinator for the MPLC Project

SIGNATURE: Michelle Smith

RE: PERMISSION FOR USE OF DATA

TITLE: THE STUDY OF TEACHER PERCEPTIONS PARTICIPATING IN THE MISSOURI
PROFESSIONAL LEARNING COMMUNITIES (MPLC) PROJECT

This memorandum serves as permission to use the MISSOURI PROFESSIONAL LEARNING COMMUNITIES (MPLC) PROJECT BAT survey raw data in my doctoral research study. I would like to use and print your survey and the survey results under the following conditions:

- I will use the data collected during the 2013, 2014, and 2015 academic year from the "MISSOURI PROFESSIONAL LEARNING COMMUNITIES (MPLC) PROJECT" expressly for the dissertation project titled, "THE STUDY OF TEACHER PERCEPTIONS PARTICIPATING IN THE MISSOURI PROFESSIONAL LEARNING COMMUNITIES (MPLC) PROJECT."
- I will use the survey data only for my research study and will not sell or use it with any compensated or curriculum development activities.
- I will send a copy of my completed research study to your attention upon completion of the study.
- I will not have access to any identifiable information except the respondents' RPDC region, school name, and personnel affiliation within the MPLC Project such as leadership team member, collaborative team member or administrator.

Appendix C:***Educator Demographic Data***

	Initiated BAT Surveys	Completed BAT Surveys	Collaborative Team Teachers (CT)	Leadership Team Teachers (LT)
Elementary Respondents 2013	1327	1252	975	277
Elementary Respondents 2014	1206	1146	871	275
Elementary Respondents 2015	926	897	669	228
Total Elementary Respondents 2013-2015	3459	3295	2515	780
Middle School Respondents 2013	369	350	268	82
Middle School Respondents 2014	612	572	437	135
Middle School Respondents 2015	554	535	415	120
Total Middle School Respondents 2013-2015	1535	1457	1120	337
High School Respondents 2013	471	445	361	84
High School Respondents 2014	719	674	540	134
High School Respondents 2015	821	779	622	157
Total High School Respondents 2013-2015	2011	1898	1523	375
Total Survey Respondents 2013-2015	7005	6650	5158	1492

Appendix D:

BAT Subscale Reliability

Item	Min.	Max.	N	M	SD	Skewness			Kurtosis
						Statistic	CR ^a	Statistic	CR ^b
S1	1	3	2574	1.20	.44	2.08	43.41	3.61	37.60
S2	1	3	2574	1.18	.42	2.25	46.82	4.40	45.85
S3	1	3	2574	1.18	.43	2.40	49.95	5.20	54.13
S4	1	3	2574	1.43	.562	0.89	18.60	-0.22	-2.32
S5	1	3	2574	1.44	.588	0.96	20.00	-0.08	-0.81
S6	1	3	2574	1.25	.498	1.83	38.03	2.50	26.05
S7	1	3	2574	1.24	.491	1.96	40.84	3.05	31.77
S8	1	3	2574	1.45	.670	1.19	24.72	0.13	1.35
S9	1	3	2574	1.38	.565	1.18	24.51	0.39	4.11
S11	1	3	2574	1.34	.548	1.33	27.68	0.80	8.30
S12	1	3	2574	1.45	.653	1.17	24.28	0.15	1.60
S13	1	3	2574	1.39	.605	1.27	26.52	0.55	5.72
S14	1	3	2574	1.47	.630	0.99	20.53	-0.10	-1.08
S15	1	3	2574	1.51	.675	0.96	19.99	-0.29	-3.01
S16	1	3	2574	1.48	.602	0.85	17.68	-0.28	-2.86
a. SE = 0.048									
b. SE = 0.096									